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Montana Bald Eagle Management Guidelines are approved:

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U.S. Fish & Wildlife Service, Region 6
Date: AUG 12 1994

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EXECUTIVE SUMMARY

This document is a revision of the 1986 Montana Bald Eagle Management Plan. This plan provides landowners and resource managers with information on the biology of bald eagles to facilitate informed decisions about land use and to promote conservation of the species and its habitat. The plan provides landowners and resource managers with information on the biology of bald eagles and management guidelines to allow them to make informed decisions about land use to help conserve the species and its habitat. This Montana Bald Eagle Management Plan will also serve as the conservation and management plan when bald eagles are delisted.

The bald eagle was classified as endangered in Montana in 1978. The Endangered Species Act of 1973 mandates formation of regional Recovery Teams charged with preparation of plans that outline specific conservation and management actions to achieve and maintain recovery of endangered species in specific Recovery Areas. Montana includes 7 Recovery Zones (in the Pacific States Recovery Area).

Surveys indicate that the population of nesting bald eagles in Montana is increasing. From 1980 to 1993, the number of breeding pairs increased from 25 to 143 surpassing the recovery goal set for the Pacific Bald Eagle. As of this writing, Montana contained the 7th largest breeding bald eagle population and largest concentration of autumn migrants in the conterminous states.

The Montana Bald Eagle Working Group was formed in January 1982, and is composed of representatives from federal and state agencies, Native American Tribes, universities, conservation groups, and private industry. The function of the Working Group is to incorporate recommendations of the Pacific States Recovery Plan in recovery and management actions specific to Montana. The Working Group also provides technical assistance to landowners and agencies concerning management of bald eagles in Montana.

Guidelines are presented to: (1) monitor existing seasonal populations, (2) manage and conserve nesting habitat, (3) identify and manage suitable nesting habitat and seasonal use areas (4) reduce and report eagle mortalities, and (5) develop public information programs. Guidelines are flexible and intended to accommodate changing national priorities and status of the bald eagle in Montana. Research needs and priorities and a glossary defining important terms also are presented.

The management goal for Montana is to facilitate population growth until the number of viable bald eagle breeding areas peaks. Thereafter, the goal is to provide secure habitat for bald eagles to maintain a viable, healthy and self-sustaining population as close to peak level as possible, in perpetuity.

Within the context of the management goal, the habitat objective is to provide sufficient habitat to maintain peak numbers of viable bald eagle breeding areas in Montana. The population objective is to maintain $\geq$ 68% of the peak number of viable breeding areas as active.

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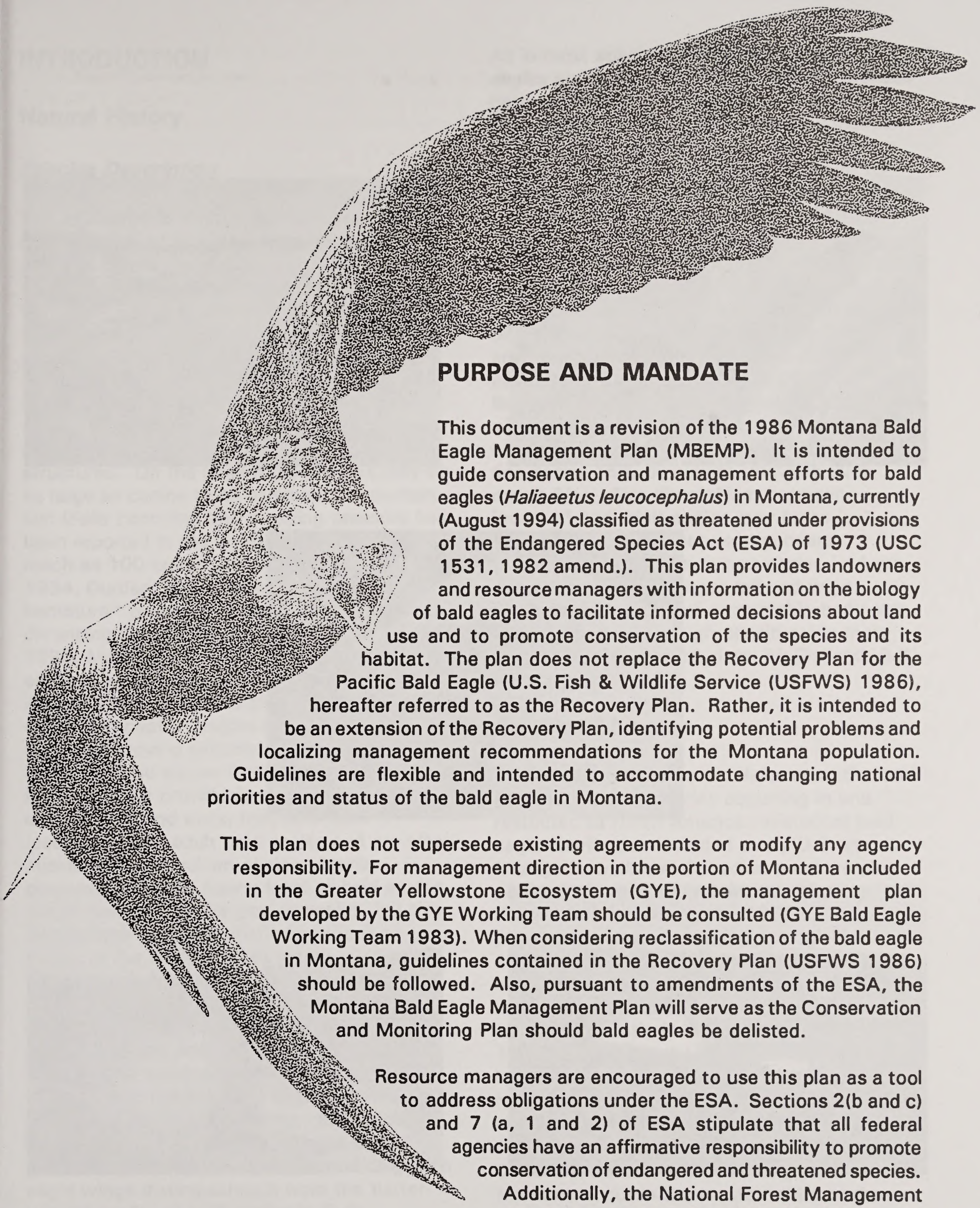

PURPOSE AND MANDATE

This document is a revision of the 1986 Montana Bald Eagle Management Plan (MBEMP). It is intended to guide conservation and management efforts for bald eagles (*Haliaeetus leucocephalus*) in Montana, currently (August 1994) classified as threatened under provisions of the Endangered Species Act (ESA) of 1973 (USC 1531, 1982 amend.). This plan provides landowners and resource managers with information on the biology of bald eagles to facilitate informed decisions about land use and to promote conservation of the species and its habitat. The plan does not replace the Recovery Plan for the Pacific Bald Eagle (U.S. Fish & Wildlife Service (USFWS) 1986), hereafter referred to as the Recovery Plan. Rather, it is intended to be an extension of the Recovery Plan, identifying potential problems and localizing management recommendations for the Montana population. Guidelines are flexible and intended to accommodate changing national priorities and status of the bald eagle in Montana.

This plan does not supersede existing agreements or modify any agency responsibility. For management direction in the portion of Montana included in the Greater Yellowstone Ecosystem (GYE), the management plan developed by the GYE Working Team should be consulted (GYE Bald Eagle Working Team 1983). When considering reclassification of the bald eagle in Montana, guidelines contained in the Recovery Plan (USFWS 1986) should be followed. Also, pursuant to amendments of the ESA, the Montana Bald Eagle Management Plan will serve as the Conservation and Monitoring Plan should bald eagles be delisted.

Resource managers are encouraged to use this plan as a tool to address obligations under the ESA. Sections 2(b and c) and 7 (a, 1 and 2) of ESA stipulate that all federal agencies have an affirmative responsibility to promote conservation of endangered and threatened species. Additionally, the National Forest Management Act charges the U.S. Forest Service (USFS) with maintaining viable populations of all species that occur on lands under its jurisdiction.

INTRODUCTION

Natural History

Species Description

The bald eagle is a large, powerful diurnal raptor classified as a sea eagle (Brown and Amadon 1968, Stalmaster 1987). Adult* bald eagles have white head and tail plumage and very dark brown to charcoal black wing and body plumage. Adult males often appear darker than females in body color. Bill and cere* are bright yellow as are lower legs and feet. Eye color is light beige. Each of the 4 toes have black claws (talons) and the feet are primary weapons and food procurement structures. On the largest toes, claws may be as large as canine teeth of an adult mountain lion (*Felis concolor*) and grasping pressure has been reported in the lay literature to be as much as 100 kg/cm^2 (1400 psi) (Herrick 1934, Durden 1974, Broley 1952). Three to 4 immature* plumage classes roughly related to chronological age have been identified (Clark 1983, McCollough 1989). Plumage, bill, eye and cere color change predictably with age. Acquisition of definitive plumage may be delayed in captive eagles and in wild bald eagles occupying saturated habitat*. Immature bald eagles 6 months to 2 years old have primarily brown plumage (including head and tail), bill and eyes; they bear little resemblance to adult bald eagles and are often misidentified as golden eagles (*Aquila chrysaetos*). Tarsi (lower legs) of bald eagles are unfeathered unlike golden eagles, but this distinguishing characteristic is difficult to detect in the field because wariness of bald eagles precludes close observation. Best distinguishing characteristics between immature bald eagles and golden eagles are profiles in flight and habitat associations, especially in summer. Golden eagles prefer upland, xeric habitat; bald eagles prefer aquatically associated habitat. Bald eagles have a longer neck and larger head than golden eagles. The positive dihedral of golden eagle wings distinguishes it from the flatter-winged profile of bald eagles in flight.

* Term defined in Glossary.

As in most species of raptors, female bald eagles are larger than males. Size differences between mated adults range from barely perceptible to over 30%. Average wingspan of adult bald eagles breeding in the northern Rocky Mountains is 80 inches (204 cm) for females (N=4) and 75.6 inches (192 cm) for males (N=9) (Harmata and Oakleaf 1992). Average weight is 11.5 lbs. (5.2 kg) for females and 9 lbs. (4.1 kg) for males. Body lengths range from 31-37 inches (79-94 cm). Bald eagles from Canada that migrate through or winter in Montana may be up to 3% larger and weigh up to 13% more than those breeding in Montana (Harmata 1984). Breeding adults in Arizona (Hunt et al. 1992) were significantly smaller than those in the northern Rockies by an average of 7% by size and nearly 15% by weight (females 20%, males 8%). Size dimorphism between juvenile* and adult eagles may be as pronounced as that between genders (Stalmaster 1987); immature eagles (<4 yrs. old) generally have longer tail and wing feathers than adults of comparable body size, but adults usually weigh considerably more (Harmata, A.R, unpubl. data, McClelland, B.R, unpubl. data).

Species Distribution

Of 8 species in the genus *Haliaeetus*, the bald eagle is the only species occurring in and restricted to North America. Historical bald eagle distribution included every U.S. state (except Hawaii) and Canadian province plus portions of northern and eastern Mexico (Brown 1976). During the 1960's, when populations were depressed through the effects of the organochlorine pesticide DDT* and its metabolites, breeding range shrank to include only remote, forested portions of the continent, mostly in Canada (Stalmaster 1987). Subsequent to the ban on use of DDT in the U.S. in 1973, bald eagle populations rebounded (Grier 1982) throughout their range.

Currently, about 75% of nesting pairs in Montana occur in the western third of the state west of the Rocky Mountain Front

(Montana Fish, Wildlife & Parks (MFWP) data). Most breeding areas* are associated with large montane rivers, lakes, impoundments and coniferous and cottonwood (*Populus spp.*) forests. The remaining 25% of pairs are scattered throughout the eastern two thirds of the state along major prairie rivers. Most prairie breeding areas are associated with the Yellowstone River, but a few bald eagles nest along the Bighorn, Tongue and lower Missouri Rivers.

Habitat and Food

Creatures of aquatic environments, bald eagles in Montana occupy riparian* or lacustrine* habitat almost exclusively during the breeding season, but occasionally exploit upland areas for food and roost sites*, especially during winter. Food habits are eclectic, reflecting the opportunistic behavior of many large raptors. Prey includes fishes, ground-dwelling scuirids, waterfowl, ungulate carrion and lagomorphs (Snow 1973, Todd et al. 1982, Stalmaster 1987, Watson et al. 1991, Mersmann et al. 1992). Use of domestic livestock carcasses is common and although depredations by bald eagles have been recorded (McEneaney and Jenkins 1983) they are rare and usually associated with golden eagles (O'Gara et al. 1983). Nest sites* are most commonly distributed around the periphery of lakes and reservoirs ≥80 acres (32.4 ha) in area and linearly along forested corridors of major rivers, usually within 1 mi (1.6 km) of shore (Wright and Escano 1986, Jensen 1988). In other states, eagles nested greater than 9.3 mi (15 km) from water while exploiting locally abundant prey such as prairie dogs (*Cynomys spp.*) or ground squirrels (*Spermophilus spp.*) (Craig, J. Colorado Div. Wildl., pers. comm.; Oakleaf, R. Wyoming Game & Fish Dept., pers. comm.). No such sites are known in Montana. Bald eagles usually choose older, large diameter trees of a variety of species as nest sites and nests* are most often in the taller trees of stands ≥3 acres (≥1.2 ha) (Wright and Escano 1986, Peterson 1986, Jensen 1988, Steenhof 1988).

Nest sites are usually as close to maximum foraging opportunities as possible, mitigated by avoidance of human activity (Harmata and Oakleaf 1992). Density of breeding pairs is highest along sinuous and braided sections of rivers and eutrophic lakes (Stalmaster 1987, Dzus and Gerrard 1993). Some pairs include both rivers and lakes in their home range*. Bald eagles often forage year round near riffles, runs, and pools of rivers. On lakes and reservoirs, eagles use shallow areas, associated wetlands, littoral zones with gently sloping shoreline and confluences of peripheral streams (Fielder and Starkey 1986, Caton et al. 1992).

Life History and Ecology

Age of first breeding in bald eagles is commonly assumed to be coincident with acquisition of definitive adult plumage (Brown 1976, Stalmaster 1987). Although bald eagles may attain adult plumage and nest as early as 4 years of age (Millburn 1979, Erickson 1982), most data indicate age of first breeding is 6 to 7 years (Harmata and Oakleaf 1992, Hunt et al. 1992). Eagles associated with vacant, high quality habitat may breed at an earlier age.

Nest building and repair occur during every season in well-established pairs but are most intense in autumn, late winter, and early spring. Migrant eagles from northern latitudes may build courtship nests* in winter in Montana. These are occasionally mistaken for nesting activities of resident eagles in newly occupied* breeding areas (Flath et al. 1991). Cartwheeling flights by bald eagles are commonly interpreted as courtship display but evidence indicates these flights in the genus *Haliaeetus* are actually intra-gender aggression and territorial behavior (Simmons and Mendelson 1993). Both females and males build stick nests and nests used over many years may attain dimensions of 10 ft (3 m) high by 7 ft (2.1 m) wide (Flath, D., MFWP, pers. comm.). Alternate nests* may be present in the breeding area, but pairs usually use one nest until it either falls from the tree or the tree is lost.

Egg laying occurs as early as 7 February in Montana but often as late as mid-April at higher elevations. Most frequent clutch size is 2, with 3 eggs as common as one. Incubation

spans 31 to 35 days, possibly influenced by ambient temperature (colder = longer). Eggs hatch from mid-March to mid-May and the nestling* period lasts 11 to 14 weeks. Nest trees with young are occasionally lost to erosion during spring runoff. Both genders incubate, brood and feed young but the female performs most of the tasks.

Nesting success and number of young fledged per attempt are highly correlated with number of years nesting (Flath et al. 1991). Productivity* also may be related to population density, i.e., in saturated breeding habitat (e.g. Saskatchewan) one young may be common (Gerrard et al. 1978) while 2 or 3 young are more common in expanding populations filling vacant habitat (Flath et al. 1991). Fledglings* are dependent on adults for 6 to 10 weeks (Gerrard et al. 1974, Sherrod et al. 1976, McClelland 1992, Wood 1992) and adults will feed juveniles other than their own.

Longevity of eagles may not be longer than 11 to 12 years for stable populations (Brown 1976), but many live in excess of 45 years in captivity. Longevity record for a wild bald eagle is 28.5 years; that eagle was banded in 1965 and encountered in late 1993 in Alaska (Schempf, P., USFWS, Anchorage AK, pers. comm.). However, the average life span is between 10 and 18 years (Clapp et al. 1982, Harmata and Stahlecker 1993).

Estimates of home range size in the breeding season vary from 0.8 mi^2 (2 km^2) (Mattson 1974) to 44 mi^2 (114 km^2) (Harmata and Oakleaf 1992) to 91 mi^2 (234 km^2) (Yates 1989), but differences may be as much influenced by research methods (visual vs telemetry location), duration and timing of observation effort, season, definition of home range, and differences among eagles. Reliable data indicate home ranges on rivers are more adequately represented linearly (length of river included) while minimum convex polygon (Mohr 1947) is more descriptive of home ranges on lakes. Accordingly, bald eagles incorporating only rivers in their range in Arizona (N = 2) and the GYE (N = 11) averaged 11.9 mi (19 km) and 4.75 mi (7.6 km) of river, respectively (Harmata and Oakleaf 1992, Hunt et al. 1992). Eagles incorporating only lakes in their home range had an average of 1.5 mi^2 to 2.7 mi^2 (4 to 7 km^2) range in Saskatchewan (Gerrard et al. 1992) and 27.7 mi^2 (71.6 km^2) in Wyoming (Harmata and Oakleaf 1992).

Most young bald eagles leave natal breeding areas their first autumn (Harmata and Oakleaf 1992, McClelland 1992). Juvenile bald eagles banded and radio-tagged in southwestern Montana moved southwest and west as far as the Pacific coast in Oregon and northern California. Juveniles radio-tagged at Big Bear Lake, 144 km (90 mi) east of Los Angeles in southern California in winter summered in Montana (Harmata 1992, Bath et al. 1993). Juveniles radio-tagged in northwestern Montana moved mostly south-southwest to the Great Basin and beyond and west-northwest post-fledging (McClelland 1992, McClelland, B.R. pers. comm.). One immature colorbanded as a nestling on the Missouri River in west-central Montana was seen its third winter in northwestern California while a contemporary radio-tagged in an adjacent nest was located in his third winter in northern Utah along the eastern shores of the Great Salt Lake (Restani and Harmata unpubl. data).

Their first spring, immatures often return within 325 ft (100 m) of their natal nest, then disperse and wander locally and regionally (Harmata and Oakleaf 1992, McClelland, B.R., pers. comm.). Immatures often follow spring spawning runs of local fishes, both altitudinally and latitudinally. During the remainder of summer, immature movements are often concentrated on larger lakes in their range. Adults remain in the vicinity of the breeding area year round but some may move altitudinally to more temperate wintering grounds or areas of abundant food, especially those that breed at high elevation.

Concentrations of autumn migrant bald eagles associated with north-south running ridgelines and mountain chains and ephemeral food sources are notable in Montana. Numbers of bald eagles migrating along the Bridger Mountains in autumn are increasing (123 in fall 1993; Hawk Watch Intern'l. unpublished

data). Large migratory concentrations of bald eagles feeding on spawning kokanee (*Oncorhynchus nerka*) have been recorded in Montana. Over 630 bald eagles were counted in Glacier National Park (McClelland 1973, Spencer et al. 1991) and over 300 have been counted at Hauser Lake near Helena (Restani and Madden 1992).

Bald eagle winter habitat is mostly associated with areas of open (ice-free) water where fishes are available and/or waterfowl congregate (Snow 1973, Stalmaster 1987). In Montana, wintering eagles are indeed associated with unfrozen portions of large lakes and free flowing portions of rivers, but are also scattered through upland areas feeding on ungulate carrion, game birds and lagomorphs (Swenson et al. 1981). Although large, communal roosts* of over 100 eagles are often associated with bald eagle wintering areas (e.g. Kiester et al. 1987), none have been discovered in Montana.

Vernal migration (northward) through Montana is much less concentrated and more protracted than autumnal (southward) migration. Vernal migration pathways include a dispersed, broad front movement through the eastern prairies toward the Canadian Shield, coincident with more concentrated movement along intermontane valleys and the Rocky Mountain Front. Concentrations of vernal migrants are usually small (<30) and dispersed, but occasionally temporary aggregations of up to 100 bald eagles may be encountered. These are usually associated with waterfowl or small mammal concentrations, spawning runs of spring spawning fish or other ephemeral food resources.

Reactions to Human Activities

Bald eagles are sensitive to a variety of recreational, research, resource and urban development activities (Mathisen 1968, Grier 1969, Fyfe and Olendorff 1976, Stalmaster and Newman 1978, Fraser 1985, Fraser et al. 1985, Mahaffy and Frenzel 1987, Buehler et al. 1991, McGarigal et al. 1991). Responses of eagles may vary from ephemeral, temporal and spatial avoidance of activity to total reproductive failure and abandonment of breeding areas. Less adequately documented is that bald eagles also tolerate apparently significant disturbances* (Harmata and Oakleaf 1992). Relationships of human activity and eagle responses are highly complex, difficult to quantify, and often site-specific. Responses vary depending on type, intensity, duration, timing, predictability and location of human activity. The way in which these variables interact depends on age, gender, physiological condition, sensitivity, residency and mated status of affected eagles. Prey base, season, weather, geographic area, topography and vegetation in the vicinity of activities and eagles (plus other variables probably unperceived by humans) also influence eagle responses. Cumulative effects of many seemingly insignificant or sequential activities may result in disruption of normal behavior (Montopoli and Anderson 1991). Lack of experimental data (due to endangered/threatened* status) limits quantification of response to empirical evidence, but general trends in eagle responses (or lack thereof) to human activity are becoming evident to field researchers and managers, although somewhat subjectively. Clearly, some bald eagles are more tolerant of human activity than others. Tolerance threshold is usually site, pair, and activity specific and a function of type, intensity, and proximity of disturbance* over exposure time. However, it is becoming apparent that there are "urban" and "rural" eagles. Urban eagles may be more tolerant of certain human activities than their rural counterparts because they have been or are exposed to more human activity at gradually increasing levels while rural eagles' exposure is abrupt.

Historical Status in Montana

First observations of bald eagles in Montana were recorded by the Lewis and Clark expedition in 1805. As the expedition traveled up the Missouri River during spring, bald eagles became plentiful enough to command attention. In the vicinity of the Milk River, on April 28, 1805, Lewis noted in his journal that "the Bald Eagle are more abundant than I ever observed them in any part of the country" (Thwaites 1904-05).

Many of the birds Lewis referred to may have been migrants. Migration paths of adult bald eagles from wintering grounds in the southern Rocky Mountain Region passed though eastern Montana in early April (Harmata 1984). Subadults* were 2 to 3 weeks later in arriving on the summering grounds suggesting their presence in eastern Montana later in April. A minimum of 8 times as many bald eagles migrate through the lower Yellowstone River area of eastern Montana as winter there (Swenson et al. 1981, Swenson 1983).

Edward Harris traveled up the Missouri River to Fort Union in 1848 with J.J. Audubon on a trip of scientific investigation, but made no mention of the occurrence of bald eagles (McDermott 1951). Harris and Audubon did not travel to the Milk River and beyond as Lewis and Clark did. Removal of cottonwood trees to power steamboat traffic may have been a significant factor limiting bald eagle use along the Missouri River during the last century and may have compromised preferred eagle habitat.

Some years later, Cooper (1868) made extensive notes on Montana wildlife but did not directly observe bald eagles. He stated that golden eagles ". . . probably find prey more easily caught on The Great Plains, and have not yet been observed west of the mountains where the White-headed Eagle is so abundant, while the latter is quite scarce on the plains, though sometimes seen."

Silloway (1901) did not report the bald eagle for Flathead Lake but did mention the species occurred near the head of Swan Lake. One adult specimen was collected at Swan Lake in the latter part of August, 1900.

E.S. Cameron (1907) spent many years studying birds throughout southeastern Montana. He reported only a single instance of bald eagles nesting in a large pine tree at the head of Horse Creek, 3 miles (4.8 km) west of Knowlton in 1893. Based on his interviews with early pioneers, Cameron stated that bald eagles were seen along the Powder River in the early 1880s and a pair nested in 1883 on the east side of the river 15 miles (24 km) south of Terry near Coal Creek. An adult was seen there again in 1885. He also mentions bald eagles being shot or found dead from strychnine bait put out for wolves (*Canis lupus*). Poisoning of wolves and other predators was widespread from the late 1880s until about 1940 (Flath 1975).

Saunders (1921) concluded that the bald eagle occurred in greatest numbers in ". . . the mountains of the northwest part." His summer sightings, however, suggest that bald eagles were uncommon as breeders early in the 20th century. All his references describe the species as rare, though a number of specific or implied breeding records are mentioned. Skaar (1980) summarized all of Saunders' known or suspected breeding records on a latilong basis. Specific summer records mentioned by Saunders (1921) include Bozeman, July, 1909; Belton (West Glacier), June 30, 1915; Dutton (near the Teton River), June 23, 1916; and a nest site on the Boulder River near Big Timber (no date).

Lewis' observations early in the 19th century suggest the species was common. However, it is unclear whether he observed nesting or migratory eagles. From other historic accounts, it seems apparent that with the influx of European man the bald eagle population declined. Mortality factors and habitat destruction included poisoning by wolfers, shooting by travelers, and timber removal by woodcutters (Taylor 1898).

Historical accounts, taken as a whole, suggest that breeding bald eagles were found throughout the state with highest densities in northwestern Montana. Poison, human disturbance, loss of nest trees, and shooting probably continued to affect bald eagles during the 20th century, and a new threat, DDT, a persistent organochlorine insecticide, began to appear. In the late 1960s, DDT and its metabolites were responsible for poor reproduction and a drastic decrease in eagle numbers (Sprunt et al. 1973, Wiemeyer et al. 1972). The impact on Montana eagles is unknown, but at least 7 nest sites in eastern Montana and 3 in western Montana were abandoned between 1953 and 1976 and may be indicative of a drastic, statewide decline.

Each autumn between 1939 and 1987 hundreds of bald eagles concentrated in the McDonald Creek area in Glacier National Park to feed on spawned-out kokanee (McClelland 1973, Shea 1978, McClelland et al. 1982, Spencer et al. 1991). Kokanee spawn in autumn of their 3rd or 4th year and expire, providing an abundant, easily available food source to piscivorous birds and mammals. Kokanee were introduced into the Flathead River drainage in 1916 and by 1939, migrating eagles were attracted to spawning salmon (McClelland 1973). In 1981, 639 eagles were counted during a single survey* (McClelland et al. 1982). The kokanee population crashed from a complex interaction of factors including overharvest by snagging, human-induced fluctuating water levels which desiccated spawning beds, and introduction of opossum shrimp (*Mysis relicta*), which out-competed young kokanee for food (Spencer et al. 1991). By 1992, only 12 eagles were counted along McDonald Creek (Table 1).

Table 1. Peak concentration of migrant eagles at McDonald Creek, Glacier National Park, Montana.

Year	Date	McDonald Creek Peak Count
1985	November 5	520
1986	November 4	236
1987	November 3	47
1988	November 8	34
1989	November 7	25
1990	December 11	22
1991	November 13	23
1992	November 25	12

Current Status in Montana

Prior to 1978, bald eagles received little management attention in Montana. After federal classification as an endangered species* in 1978, resource management agencies were mandated to protect and conserve the species and its habitat. Then, only 12 breeding areas were known in Montana (Servheen 1978). Intensive nesting surveys were initiated in 1980 and the Montana Bald Eagle (Working Group*) began coordinating an interagency effort in 1982. As of autumn 1993, 189 current or historical* breeding areas were known, and Montana ranked 7th in the nation for number of breeding bald eagles.

A portion of breeding areas known is due to increased survey effort and coverage but most is due to real population growth (Flath et al. 1991). Logistic regression analysis (Hosmer and Lemeshow 1989, Montopoli 1992) of population trend data indicates that Montana may support as many as 345 occupied breeding areas by the year 2033 (Fig. 1), provided sufficient habitat is available.

Montana's bald eagle nesting population is one of the most productive in the western United States (Table 2). Long-term (1978-90) average of 1.27 young per occupied nest and 77% nest success[1] (Flath et al. 1991) exceeded minimum values proposed by Sprunt et al. (1973) for maintenance of stable populations.

As the autumn concentration of bald eagles at McDonald Creek in Glacier National Park declined, a nearly coincident concentration appeared and increased at Hauser Lake, an impoundment of the Missouri River in west-central Montana, also associated with spawning kokanee (Restani and Madden 1992). Kokanee had been accidentally introduced to Hauser Lake in 1978. Although from 15 to 30 eagles historically wintered in that stretch of the Missouri River, large numbers (>175 eagles) were noted in 1989 and by 1991 the concentration had grown to over 300. However, there is no evidence that eagles that visited McDonald Creek moved to Hauser Lake. None of 124 eagles auxiliary marked at McDonald Creek have been observed at Hauser Lake (Restani and Harmata 1993) even though some still pass through the Flathead Valley (McClelland, B.R. pers comm.). Eagles associated with each concentration apparently originate from different populations

[1]*See Postupalsky (1974) for reproductive terminology.*

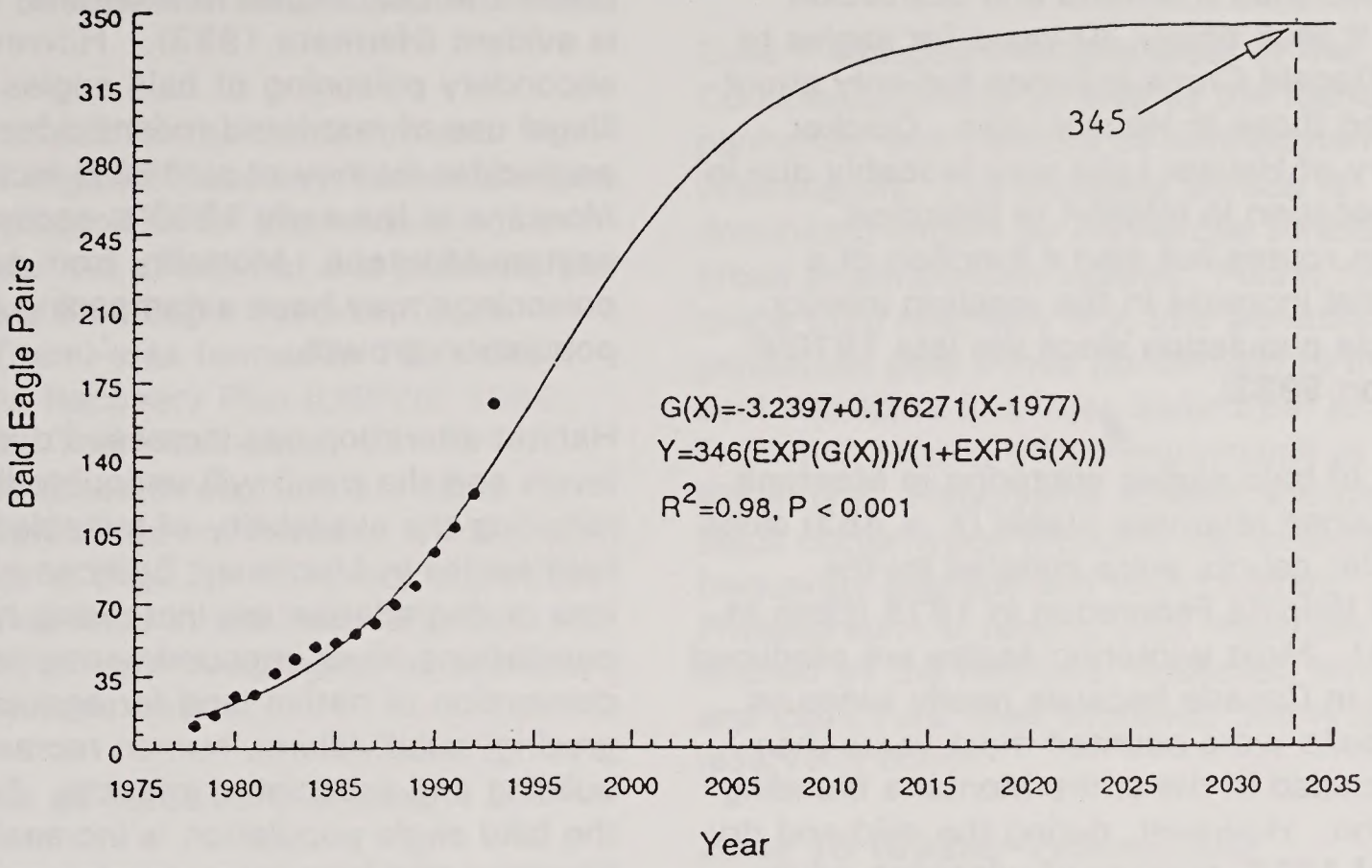

Figure 1. Logit regression analysis of bald eagle population growth in Montana. Peak number of 346 breeding pairs may be reached in 2060, but 345 may be reached as early as 2033.

Table 2. Productivity of bald eagle populations in the Western U.S.

State	Success	# Fledged/ Occupied*	Brood Size
Montana	73%	1.31	1.81
Idaho	79%	1.34	1.71
Wyoming	71%	1.12	1.58
Washington	69%	1.03	1.50
Oregon	58%	0.88	1.53
California	66%	1.01	1.53

Source: 5-year average, 1986-1990, from Steenhof (1990).

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and migrate by different flyways. Those associated with McDonald Creek originated primarily in the McKenzie River watershed of northwestern Canada (McClelland et al. 1994) while those migrating east of the Continental Divide may be primarily from the Churchill River watershed (Harmata and Stahlecker 1993). It took nearly 30 years for eagles to find McDonald Creek kokanee but only about 10 to find those in Hauser Lake. Quicker discovery of Hauser Lake was probably due in part to location in relation to historical migration routes but also a function of a substantial increase in the western interior bald eagle population since the late 1970's (Swenson 1983).

Number of bald eagles wintering in Montana has remained relatively stable ($\bar{x}$ = 453) since mid-winter counts were initiated by the National Wildlife Federation in 1978 (Flath et al. 1991). Most wintering eagles are produced or breed in Canada because nearly twice as many adults were counted most years than were included in the entire Montana breeding population. However, during the mild and dry winter of 1988, number of wintering adults counted was nearly identical to number of adults breeding in Montana. Numbers may be a function of weather severity in climes external to Montana in winter.

Number of bald eagles recorded during spring survey flights and research activity is also increasing. An average 152 (range 46-293) bald eagles occurred in late March each year (N=7) along the Yellowstone River between Billings and Miles City (Flath, D. MFWP, pers. comm.) and up to 76 eagles per hour moved through the valley between the Bridger and Crazy Mountains between Livingston and White Sulphur Springs (Rogers 1982). Between 1990 and 1992, numbers of vernal migrant bald eagles passing along the Rocky Mountain Front increased 55%, from 90 to 202 (Tilly and Tilly 1993).

Direct and indirect eagle mortality induced by humans continues to occur in Montana. Rates may be actually stable or decreasing but absolute numbers may be increasing because of larger population size. Factors include shooting, accidental trapping, electrocution, collisions with vehicles, structures and powerlines, and poisoning. Effects of organochlorine insecticides (DDT) have subsided in recent years (Wiemeyer et al. 1993) and although heavy metals such as lead (Pb), selenium (Se) and mercury (Hg) are present in bald eagles in Montana, little affect is evident (Harmata 1993). However, secondary poisoning of bald eagles through illegal use of restricted rodenticides and predacides (Henny et al. 1987) increased in Montana in the early 1990's, especially in eastern Montana. Mortality from secondary poisonings may have a dampening effect on population growth.

Habitat alteration has increased over historic levels and the trend will undoubtedly continue, reducing the availability of suitable* habitat for bald eagles in Montana. Sources of habitat loss or degradation are increasing human populations, river impoundments, logging, conversion of native land for agriculture, grazing, subdivisions, human recreation, road building and associated impacts. Even though the bald eagle population is increasing in Montana, the long-term carrying capacity may actually be decreasing. Positive steps will have to be taken to ensure the security of bald eagle habitat in the future.

BALD EAGLE RECOVERY* IN MONTANA

Legal Status and Recovery Process

Persecution of bald eagles and golden eagles in livestock producing areas of the west prompted passage of the Bald Eagle Protection Act of 1940 (16 USC 668). Further protection was afforded in 1972 with inclusion of raptors under the Migratory Bird Treaty Act (16 USC 703, 1918). As a result of severe population declines (Sprunt et al. 1973) induced by pesticide residues mid-century (Krantz et al. 1970, Wiemeyer et al. 1972), further protection was afforded under the ESA of 1973 (16 USC 1531, 1982 amend.) for the then classified southern subspecies (*H.l. leucocephalus*) that did not occur in Montana. Federal protection as an endangered species was not extended to bald eagles in Montana

until 14 February 1978 (43 CFR 6233) when the then classified northern subspecies (*H. l. alascanus*) was included. Currently, subspecies are not legally recognized. Montana state law does not list the bald eagle as either endangered nor threatened but a "Species of Special Interest or Concern" (Flath 1984).

The ESA provides for the formation and operation of regional Recovery Teams charged with developing plans for the recovery of a listed species. As a result of this process, the Pacific States Bald Eagle Recovery Team (Recovery Team) was formed in 1981 and produced the Recovery Plan (USFWS 1986). The Recovery Team delineated 47 geographical zones throughout a 7-state region. Seven zones are included wholly, or in part in Montana (Fig. 2). Recovery objectives and actions outlined in the Recovery Plan (USFWS 1986) were designed to be applied on a zone-by-zone basis.

Description of Recovery Zones

Management zones presented in the Recovery Plan (USFWS 1986) are referred to here as Recovery Zones*, and numbers correspond. Redesignation is an attempt to avoid confusion between regional areas emphasized in the Recovery Plan (USFWS 1986), and boundaries assigned to specific bald eagle nest site management zones* presented here (see GUIDELINES FOR MANAGEMENT OF BALD EAGLES, pg. 15). Recovery Zones in Montana were determined by boundaries of major hydrologic units (watersheds) and incorporate aggregations of bald eagles with similar reproductive performance in similar habitat (Table 3). Four of 7 zones in Montana extend into adjacent states.

Zone 7 Upper Columbia Basin

Zone 7 includes Montana west of the Continental Divide as well as the Idaho panhandle and portions of northeastern Washington. The Montana portion is dominated largely by coniferous forests with broad intermountain valleys. Forest types range from relatively dry, low elevation ponderosa pine (*Pinus ponderosa*) to moist, cool subalpine fir (*Abies lasiocarpa*) and Engleman spruce (*Picea englemanii*) at higher elevations. Floodplains support stands of black cottonwood (*Populus trichocarpa*) frequently interspersed with conifers. Physiography is rugged with mountain ranges drained by the Flathead, Kootenai, Bitterroot and Clark Fork River systems. Many lakes and reservoirs occur.

Zone 18 Greater Yellowstone

Zone 18 encompasses eastern Idaho, southwestern Montana and northwestern Wyoming. A separate management plan has been prepared for this zone (GYE Bald Eagle Working Team 1983). The Montana portion consists primarily of those lands bordering Yellowstone National Park. The area is dominated by lodgepole pine (*P. contorta*) and Douglas fir (*Pseudotsuga menzesii*) forest. Most bald eagle habitat lies above 6000 feet (1828 m) elevation.

Table 3. Area of recovery zones and major inclusive land uses in Montana.

Recovery Zone	Area Sq. Mi.	Cropland Sq. Mi.	%	Rangeland Sq. Mi.	%	Forest Sq. Mi.	%
7-Upper Columbia Basin	24,632	973	4	3,197	13	20,051	81
18-Greater Yellowstone	2,041	0	0	509	25	1,527	75
38-Missouri Headwaters	12,021	887	7	7,288	61	3,646	30
39-Upper Missouri	21,166	5,695	27	10,524	50	4,274	20
40-Bighorn	13,577	1,888	14	8,779	65	2,612	19
41-Powder River	25,350	2,721	11	21,421	85	877	3
47-Missouri Basin	48,507	11,091	23	34,434	71	2,166	4
State	147,294	23,256	16	86,152	58	35,153	24

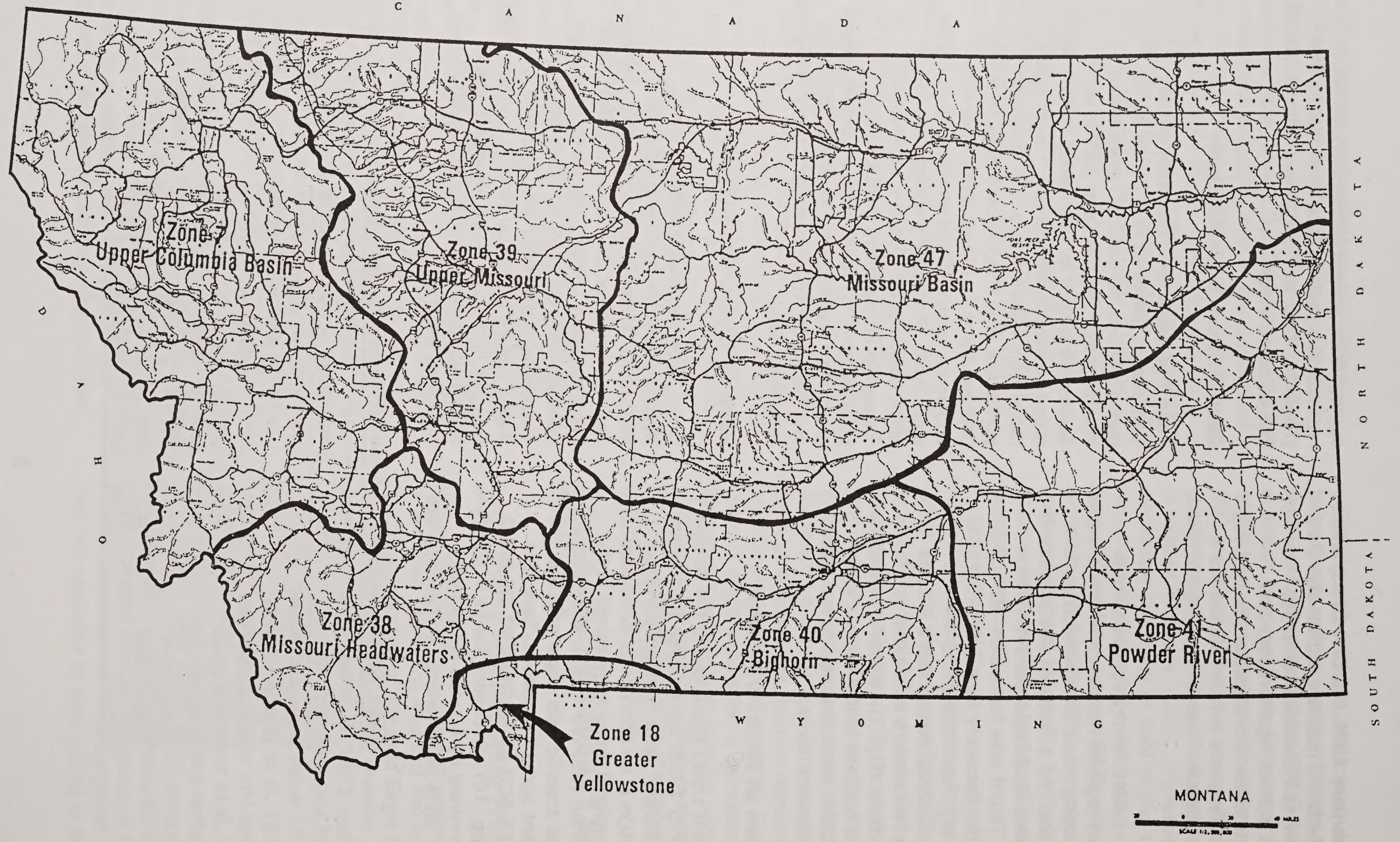


Figure 2. Bald eagle Recovery Zones in Montana.

Zone 38 Missouri Headwaters

Zone 38 consists of those lands which form the headwaters of the Missouri River. It is primarily mountain foothills which supports shrub-grass communities interspersed with islands and stringers of Douglas fir. Extensive cottonwood forests occur along the lower reaches of major river floodplains. The Missouri River originates at the confluence of the Gallatin, Madison, and Jefferson Rivers. Other significant water bodies include Ennis Lake, and Lima, Clark Canyon, Ruby, and Willow Creek Reservoirs.

Zone 39 Upper Missouri

Zone 39 is comprised of the Missouri River watershed above Coal Banks Landing in Choteau County. Extensive grass and shrub-grass steppe areas are interspersed with isolated mountain ranges, buttes, and river breaks. Northern portions of the area were heavily glaciated and numerous potholes and alluvial benches are present. Montane habitats are present at higher elevations. The foothill transition area known as the Rocky Mountain Front, includes much productive wildlife habitat and is an important eagle migration corridor. Cottonwood forests are common along several major floodplains. Major reservoirs (Canyon Ferry, Hauser and Holter Lakes) important to eagles occur along the Missouri River in this zone.

Zone 40 Bighorn

Zone 40 includes the Yellowstone and Bighorn River watersheds from the town of Emigrant to the mouth of the Bighorn River. The area is characterized by a combination of high mountains, foothills, and shrub-grass steppe. River floodplains generally support mature riparian cottonwood forest, while foothill areas are dominated by juniper (*Juniperus spp.*) and pine gradually giving way to higher elevation forests of Douglas fir, lodgepole pine, and white bark pine (*P. albicaulis*). Zone 40 extends into northcentral Wyoming.

Zone 41 Powder River

Lands drained by the Yellowstone River and its tributaries from the mouth of the Bighorn River to the North Dakota border comprise Zone 41. Primarily upper sonoran, this zone also extends into adjacent portions of northeastern Wyoming. Areas of grassland and shrub-grass steppe interspersed with badlands and breaks are typical of this zone. Several insular ranges of high hills occur and support ponderosa pine forests. Floodplains of the Yellowstone, Powder, and Tongue Rivers support mature cottonwood forests.

Zone 47 Missouri Basin

Zone 47 includes the Missouri River watershed below Coal Banks Landing. Many reservoirs occur throughout the zone with Fort Peck Reservoir being the largest. The area is primarily plains/upper sonoran zone. The northern portions of the area were heavily glaciated which resulted in numerous potholes. The northeastern portion include mid-grass prairie, interspersed with cropland. Heavily eroded river breaks along the Missouri River and Big Dry drainages support substantial tracts of ponderosa pine forest. Ponderosa pine and Douglas fir occur in several isolated mountain ranges. Mature cottonwood forests occur along the lower Missouri, Milk, and Poplar Rivers.

Reclassification Criteria

Downlisting

The process of federal reclassification of an endangered species to threatened status is termed *downlisting**. Downlisting may occur if the best scientific and commercial data available indicate the species is no longer in danger of becoming extinct (ESA Sect. 3 (6)). Reclassification from endangered to threatened could be considered if the number of nesting pairs continues to increase (USFW 1986). On July 12, 1994, a proposed rule to downlist the bald eagle in 4 of the 5 National Recovery Areas* was published (59 Federal Register 35584)

Delisting

The process of removing a federally classified endangered or threatened species from the endangered species list is termed *delisting**. Guidelines recommended by the Recovery Team state that delisting should occur regionwide, based on the following criteria:

1. A minimum of 800 nesting pairs present in the 7-state Recovery Area.

2. Nesting pairs produce an annual average of at least 1.0 fledged young per pair, with an average success rate per occupied site of not less than 65% over a 5-year period.

3. Population goals are met in at least 80% of the management (Recovery) zones with nesting potential*.

4. Delisting should not occur when there is a long-term decline in any sizeable (greater than 100 birds) wintering aggregation. Reclassification can occur if the population continues to increase during 5 consecutive years.

By 1990, pair goals set in the Recovery Plan for Montana had been met (Table 4).

Table 4. Total and viable* bald eagle breeding areas in Montana, 1993.

Recovery Zone	Known Nesting Locations	Currently Viable	MT Recovery Goal
007	93	86	52
018	16	15	6
038	19	15	6
039	21	19	10
040	21	13	11
041	17	17	8
047	3	1	6
Total	190	166	99

BALD EAGLE MANAGEMENT IN MONTANA

Montana Bald Eagle Working Group

The basic purpose of the Montana Bald Eagle Working Group (Working Group) is to assist in achievement and maintenance of goals and objectives for recovery of bald eagles as presented in the Recovery Plan (USFWS 1986). The Working Group is therefore supplemental to and supportive of Recovery Team efforts. The Working Group incorporates Recovery Team recommendations into specific management and recovery actions in Montana in cooperation with various management agencies. The Working Group also coordinates management, research, and information exchange on bald eagles.

In January 1982, the Working Group assumed interagency committee status through authorities of the Area Manager, USFWS, and the Director, MFWP. Section 7 consultation requirements for this plan have been met (Appendix I).

Objectives of the Working Group are to:

a. Produce a Bald Eagle Management Plan for Montana.

b. Provide a forum for the exchange of information on bald eagles and their habitats.

c. Provide technical assistance with planning for and management of bald eagle habitat.

d. Identify and interpret bald eagle habitat requirements consistent with current research on bald eagle ecology.

e. Facilitate research on and management of bald eagles in Montana by: (1) suggesting research priorities, (2) reviewing proposals to avoid duplication of effort, (3) coordinating and standardizing procedures for wintering and nesting surveys, and (4) ensuring the availability of current bald eagle data.

f. Cooperate with the Pacific States Bald Eagle Recovery Team.

g. Provide consistency for breeding area and winter roost management plan development.

h. Assist in development of guidelines for the identification of suitable habitat which may be needed to increase or maintain bald eagle populations over time.

Participation is based on management responsibility, technical expertise and degree of involvement in the recovery of bald eagles. Members represent federal and state agencies, Native American Tribes, conservation groups, universities, and private industry. Periodic meetings are held to inform participants of progress on specific tasks and acquire additional input. Working Group meetings include outside speakers and open public sessions to incorporate as much information and public involvement as possible.

When requested, the Working Group may assist private landowners and public land managers in solving specific land management problems related to eagles. However, recommendations offered by the Working Group are strictly advisory and carry no regulatory authority. Participants in the Working Group are:

Mark Andreasen
U.S. Army Corps of Engineers

Dale Becker
Confederated Salish and Kootenai Tribes

Dennis L. Flath
Montana Fish, Wildlife & Parks

Steve Gniadek
National Park Service

Glen N. Gray
Montana Department of State Lands

Al Harmata
Montana State University

Robert M. Hazlewood
U.S. Fish & Wildlife Service

Lorin Hicks
Plum Creek Timber Company

Dan Hinckley
Bureau of Land Management

Jerry Jacobs
Bureau of Reclamation

Beth Madden
Montana St. University

Robin Magaddino
Bigfork, Montana

B. Riley McClelland
University of Montana

Pat McClelland
Research Biologist

Frank Pickett
Montana Power Company

Larry Rau
Bureau of Land Management

Marco Restani
Montana State/Utah State University

Bill Ruediger
U.S. Forest Service

Pete Schendel
Bureau of Reclamation

Betsy Spettigue
Montana Fish, Wildlife & Parks

J.T. Stangl
U.S. Forest Service

Greg Watson
Plum Creek Timber Company

Dick Wernham
U.S. Army Corps of Engineers

Alan Wood
Montana Department of State Lands

Rick Yates
West Glacier, Montana

Montana Bald Eagle Management Plan

Objectives of the Montana Bald Eagle Management Plan are to:

a. Establish goals and objectives for the Montana bald eagle population and present management guidelines for achievement.

b. Inform landowners and land managers of long-term management and recovery objectives as well as past and present status of Montana bald eagles.

c. Identify potential problems for the Montana population and offer recommendations to avoid conflicts* with other land uses.

d. Standardize methods for identifying and mapping habitat, monitoring* eagle productivity and use, and completing localized management plans.

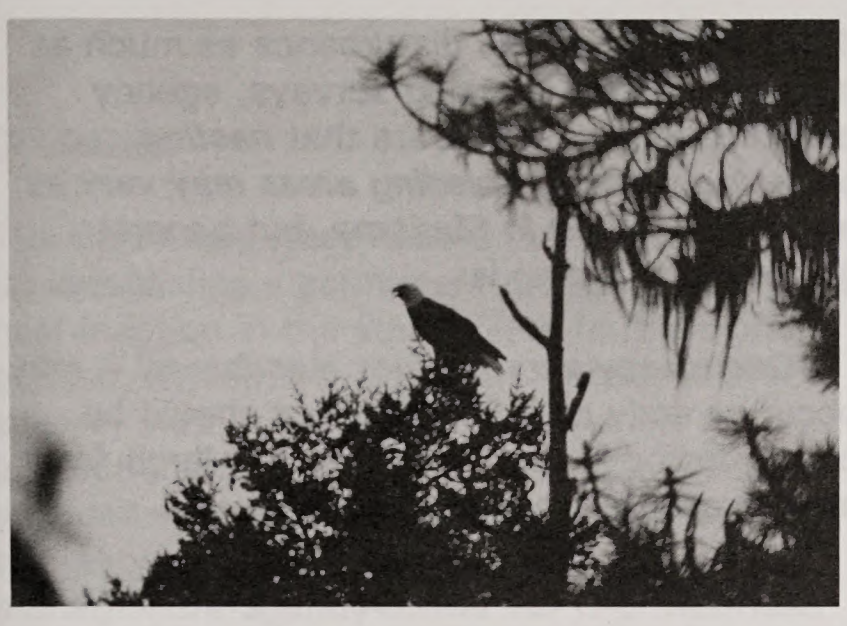
Goals and Objectives for Management of Bald Eagles

Management goal for Montana will be to facilitate population growth until number of breeding pairs of bald eagles peaks in each Recovery Zone and thereafter, to provide secure habitat for bald eagles to maintain a viable, healthy and self-sustaining population as close to peak level as possible, in perpetuity. Habitat Management and Population Objectives in Montana will be determined by peak number of *viable breeding areas*. A *viable breeding area* is a breeding area that has contained an active* pair of bald eagles (nest) within the last 5 years. Peak is defined as number of viable breeding areas preceding 3 consecutive years of no growth. Peak level may be revised upward if after 3 consecutive years of no growth, number of viable breeding areas increases beyond previous peak.

Population and Habitat Management Objectives stated here are synonymous with population and habitat *goals* of the Recovery Plan (USFWS 1986). They are higher due to unanticipated growth in the population beyond that required for recovery. As of 1993, more vacant habitat existed in Montana than pairs to fill it as indicated by recent exponential population growth (Fig. 1). Although habitat is being lost at an unknown rate, the number of bald eagle breeding pairs will peak in the future. Whatever the peak, it will be well above the minimum population goal of 99 breeding pairs set for the state in the Recovery Plan (USFWS 1986). As of late 1993, 143 breeding pairs in 166 viable breeding areas were known in Montana (Working Group data). The Working Group believes objectives will be obtained by reasonable implementation and application of guidelines presented in GUIDELINES FOR MANAGEMENT OF BALD EAGLES (pg. 15).

Habitat Management Objective

The Habitat Management Goal in the Recovery Plan (USFWS 1986, pg. 28) ". . . is the minimum number of territories* needed to provide secure habitat for (a) recovered* population . . . because not all territories can be expected to be occupied" (or active) "in any given year." Accordingly, the Habitat Management Objective for Montana is to maintain number of suitable breeding areas at peak number of viable breeding areas.



Population Objective

Population Objective for bald eagles in Montana was chosen in consideration of average activity rate of 2,610 nests investigated in North America in the 1970s and 1980s (Stalmaster 1987, Table C, Appendix 1) and average percent of breeding areas that were active in Montana between 1979 and 1993. The Population Objective for Montana will be to maintain number of *active breeding pairs* ≥ 68% of Habitat Management Objective number.

Productivity

Management objectives outlined in Recovery Plans (USFWS 1986, 1983) and other regional management plans (i.e. GYE Bald Eagle Working Team 1983) include productivity minimums based on *occupancy** of breeding areas. Flath et al. (1991) found significant problems associated with the occupancy concept, including difficulty with precise definition, determination of occupancy due to the presence of large numbers of vernal migrants, the 45-day spread of nest initiation dates in Montana, undue disturbance of nesting eagles, and related statistics deceptively misrepresenting status of the Montana population. They suggested less emphasis on or elimination of occupancy surveys and associated statistics. The Working Group does not ignore the benefit of considering occupancy related statistics in evaluating health and status of bald eagles in Montana but believes demonstrated problems limit their value as generally representative. Accordingly, ***values of young per occupied breeding area and percent occupied breeding areas successful* will not be included in management objectives*** for Montana but will be considered for management perspective.

Productivity objectives in the Recovery Plan (USFWS 1986) are 1.0 young per occupied breeding area with 65% success over a 5-year period. The Working Group encourages survey participants to be vigilant to drastic changes in these parameters and will consider relative performance in Montana when indicated.

GUIDELINES FOR MANAGEMENT OF BALD EAGLES

Population Monitoring

Assessing the status of bald eagles is basic to effective implementation of the Recovery Plan (USFWS 1986) and should include: (1) annual surveys of number, productivity, and distribution of nesting pairs and (2) annual coordinated counts of wintering bald eagles in each state (Henny and Anthony 1989). Additionally, Henny and Anthony (1989) felt levels of environmental contaminants should be monitored to evaluate effects on survival and productivity. Consistent with Recovery Plan (USFWS 1986) mandates, the Working Group will establish monitoring objectives, recommend survey methods, assign and coordinate annual surveys, and compile and evaluate survey results to evaluate status, health, and management needs of the Montana bald eagle population. Surveys ***must be*** a cooperative effort among federal, state, and private interests. Repository for information will be the offices of the Nongame Coordinator, MFWP, Bozeman, MT 59717, and Montana Field Supervisor, Ecological Services Division, USFWS, Helena, MT 59601.

Monitoring Objectives

1. Determine status of bald eagle populations (breeding, wintering and migratory) in Montana to ascertain trends.

2. Identify problems that require additional investigation and/or management action.

3. Periodically monitor environmental contaminants to evaluate effects on achievement and maintenance of Recovery Goals (USFWS 1986) and Management Objectives.

Monitoring Methods, Tasks and Guidelines

Breeding Population

Traditional monitoring methods for bald eagle breeding populations involve annual completion of 3 temporally separate surveys (collectively designated productivity surveys) to determine: 1. occupancy, 2. activity, and 3. results of all breeding attempts in the population[2].

For reasons outlined above[3], the Working Group advocates modification of accepted productivity survey practices for more efficient, less disruptive, and more representative methods of determining population trends. ***Number of <u>active</u> breeding pairs <u>and</u> number of total young of advanced age* produced*** adequately represent annual status and reproductive performance of the population. Analysis of these annual statistics in a historical context will indicate trends.

Absence of occupancy surveys will not affect detection of new breeding areas because Flath et al. (1991) almost always found new nest sites or pairs during activity surveys, seldom during occupancy surveys, and rarely during production surveys or thereafter. Continued determination of occupancy would be at the discretion of the entity responsible for completion of productivity surveys.

Specific timing of surveys must be based on local nesting chronology. Surveys should be designed to minimize disturbance as much as possible. When planning surveys, agency personnel should be aware that ***nesting phenology among breeding areas may vary as much as 45 days in Montana***, but general guideline for timing is:

Occupancy surveys *(not mandatory)* -- may occur as early as 7 February but should be concentrated in the third week of March for most breeding areas.

Activity surveys and searches for new nests -- should generally occur from 15 April to 5 May (cottonwood leaf-out).

Production surveys -- should occur in late June but may extend into early July.

Task: Annually survey in a standard manner all breeding areas known to be viable to determine status and annual productivity.

Guidelines:

1. A Bald Eagle Nest Survey Form (Appendix II) standardizes data collection during nesting surveys and should be used. Individuals or agencies assigned specific nest survey responsibilities will receive from the Working Group survey forms prior to each year's survey effort.

2. At least once every 5 years, survey historical breeding areas that have not been active since 1980 to determine current status.

These surveys should follow timing guidelines above and Bald Eagle Nest Survey Form (Appendix II) should be used. The Working Group will coordinate surveys to ensure coverage.

Task: Maintain current nest record information on all bald eagle nests.

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[2]*See Postupalsky (1974) for descriptions.*

[3]*See Productivity section, pg. 15.*

Guideline:

The Bald Eagle Nest Record Form (Appendix III) establishes a permanent record of each nest location in the state. This form includes general descriptive information about the nest site. A map of the nest location and instructions on how to find the nest should be included whenever a new nest is found. It is the responsibility of the respective land management agency (or MFWP if private land is involved) to complete the Bald Eagle Nest Record Form and remit to designated representatives of the Working Group.

Breeding Population, Post-delisting

Section 4 (g) of the ESA of 1973 as amended requires the USFWS in cooperation with MFWP to implement a system to monitor the bald eagle population for not less than 5 years following delisting. Population monitoring methods presented here will fulfill that requirement.

The Working Group recognizes that there are significant logistical and financial constraints associated with both continued survey of the entire population and random sampling of bald eagle breeding areas at any level. The following monitoring plan is an attempt to increase efficiency while retaining objectivity and a representative picture of bald eagle population status in Montana over the long-term. The Working Group considers monitoring bald eagles in Montana a dynamic process and will annually evaluate the efficacy of the scheme and institute changes as needed.

Task: Survey the bald eagle population annually in Montana for 5 years after delisting. Six years after delisting, reduce annual survey coverage. Monitor 1/3 of total viable breeding areas annually, in sequence, until all viable breeding areas are surveyed within 3 consecutive years.

Post-delisting, breeding areas will be assigned to one of 3 Survey Units, each containing approximately ⅓ of total viable breeding areas in Montana (Fig. 3). Unit surveyed the first year (year delisted + 6) will be randomly selected. Sequence of units surveyed the following years also will be randomly determined from those not surveyed previously. Once established, the sequence will be the template for surveys in subsequent years. Expanding population and changing distribution may require further modification of Survey Unit boundaries to achieve approximate 33% coverage annually.

Seasonal Concentrations

Seasonal concentrations of transient and resident bald eagles occasionally reach prodigious proportions in Montana. Glacier National Park supported over 600 eagles in autumn (Spencer et al. 1991) and Hauser Lake on the Missouri River over 300 in autumn (Restani and Madden 1992). Concentrations of fewer eagles occur in spring but are more numerous, widely dispersed, and more ephemeral, although undoubtedly involving as many eagles as autumn concentrations. Over 600 bald eagles have been counted on mid-winter surveys in Montana (Flath et al. 1991) but probably represent less than half the total present.

The ESA of 1973 as amended, provides equal status and protection to all bald eagles in Montana at any time, regardless of origin. The Recovery Plan (USFWS 1986) mandates identification of seasonal use areas, population size, and roost sites. Site-specific evaluation will be used by the Working Group to design a monitoring strategy consistent with Monitoring Objectives.

Task: Conduct seasonal surveys to identify location, size and status of seasonal (autumn, winter, spring) concentrations of bald eagles and identify key foods and habitats. Emphasis should also be placed on identifying communal roost sites and staging areas. All concentrations of 30 eagles or more within a 1 mi^2 (2.6 km^2) area for more than 7 days should be identified.

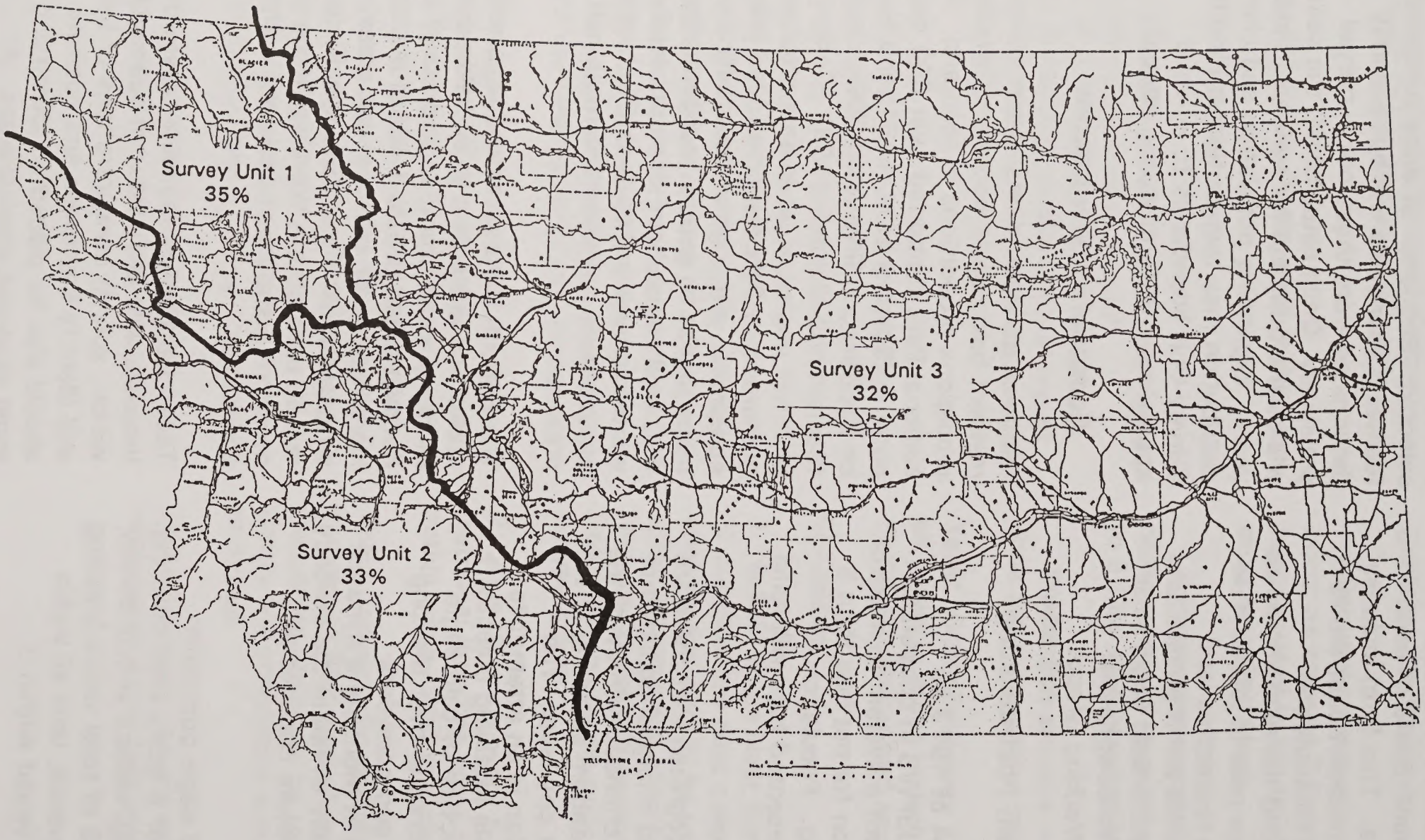


Figure 3. Survey units and percent of viable breeding areas included, 1993.

Guidelines:

1. Encourage, coordinate, and fund seasonal surveys of known concentrations (e.g. weekly census of autumn concentrations at Hauser Lake).

2. The Working Group will coordinate the bald eagle winter surveys sponsored by the Raptor Research and Technical Assistance Center, Boise, ID and maintain 4 established routes: Kootenai River below Libby Dam, Upper Flathead Valley, Upper Missouri (Three Forks to Great Falls) and Yellowstone/Bighorn (Billings to Miles City and Bighorn River upstream to Yellowtail Dam).

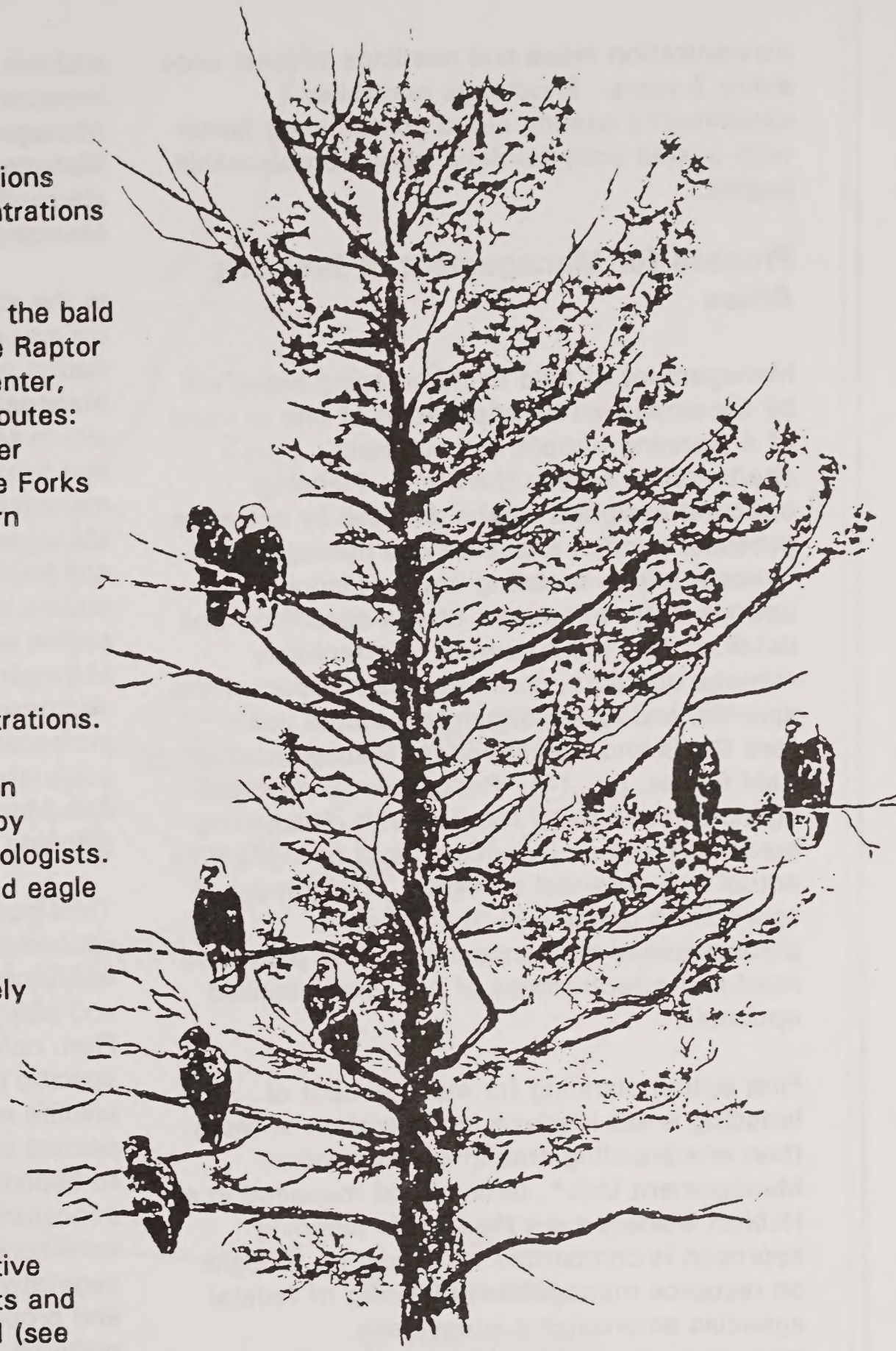
3. Solicit input of agency biologists to identify locations of previously unknown seasonal bald eagle concentrations.

4. Identify seasonal fish concentration and spawning areas within the state by communication with MFWP fishery biologists. These areas may hold potential as bald eagle concentration areas.

5. Inspect suitable habitat during likely concentration periods when possible.

Environmental Contaminants

Bald eagles exploit aquatic and terrestrial habitats and prey (Stalmaster 1987) that biomagnify contaminants. The negative impact of environmental contaminants and pesticides has been well documented (see review, Wiemeyer 1991). Migrant and resident bald eagles contain residues of organochlorine pesticides (DDT, DDE, PCBs) and heavy metals, and blood analysis indicates exposure to organophosphate and carbamate compounds (Wiemeyer et al. 1989, Harmata 1993). Despite sometimes elevated or toxic levels of contaminants in blood, populations of bald eagles in Montana and regionally are increasing and reproducing well. However, contaminant levels are high and increasing in some ecosystems* in the west (n.b. Columbia



River Estuary; Anthony pers. comm.) where younger age classes of bald eagles produced in Montana spend the winter.

Task: Determine incidence, severity, and effect of environmental contaminants on bald eagles in Montana.

Guideline: Capture and analyze blood samples from wild bald eagles at seasonal

concentration areas and nestlings at least once every 3 years. Encourage controlled experiments relating blood contaminant levels with overall body burdens using nonreleasable eagles.

Process for Management of Breeding Areas

Management of bald eagle breeding areas will be accomplished by application of one or more of 4 planning options to each nest site/breeding area in the state. **Planning option(s) assigned will be dictated by actual or potential conflict exposure and management concern within breeding areas.** Planning options differ in amount of site-specificity and detail of data input needed to effectively manage conflicts, promote conservation of the species, and achieve/maintain stated goals (see **Goals and Objectives for Management of Bald Eagles**, pg. 14). Resource management agencies need to be familiar with all breeding areas within their jurisdiction and be vigilant to actual and potential conflicts. Assignment of appropriate option will then follow a predetermined sequence initiated by perceived need and effectiveness of previously applied option(s).

First option planning for management of breeding areas involves incorporation of more than one breeding area into a Population Management Unit*, defined and managed in a **Habitat Management Plan.** This planning approach is compatible with existing thought on resource management planning of federal agencies emphasizing ecosystem management. Habitat Management Plans may incorporate breeding areas which are experiencing impacts or have existing site-specific plans. Plan development is encouraged to be research-supported and habitat oriented, i.e. directed at describing, evaluating and conserving bald eagle habitat within an entire Population Management Unit, not just specific breeding areas. Habitat Management Plans are conceptually similar to programmatic Environmental Impact Statements, in that they will attempt to address and manage all potential negative impacts to bald eagles in a Population Management Unit *before* they occur. **Habitat Management Plans are the preferred alternative for management of bald eagles in Montana.**

In the absence of Habitat Management Plans (or any other planning attention), second option planning applies concentric **Nest Site Management Zones*** (Fig. 4) around each nest site in Montana. As a result, every current and future nest site has a *de facto* management plan by application of Nest Site Management Zone Guidelines. Human activity and habitat alteration restrictions needed to ensure long-term suitability of habitat for bald eagles are defined for each of 3 Nest Site Management Zones. Restrictions generally decrease as distance from nest sites increases. If conflicts cannot be resolved or adequately managed by application of Nest Site Management Zone guidelines, third option planning becomes necessary.

Third option planning focuses on refining second option planning to include more site-specificity in Management Zone boundaries and plan emphasis. A **General Breeding Area Plan**, compiled primarily with existing site-specific information and consultation with wildlife management agencies, modifies second option Management Zone boundaries to become more or less restrictive or concentric. Modifications are based on considerations such as topographical and vegetative screening of the nest site, historical and proposed land use, human activity patterns, and pair history and behavior. If conflicts persist, fourth option planning should be employed.

Fourth option planning involves development of a **Site-specific Management Plan.** This option is research-supported and includes precise delineation of Management Zones based on observed movements, habitat use, and responses to human activity exhibited by specific bald eagle breeding pairs as determined by intensive research (i.e., long-term observation, auxiliary marking).

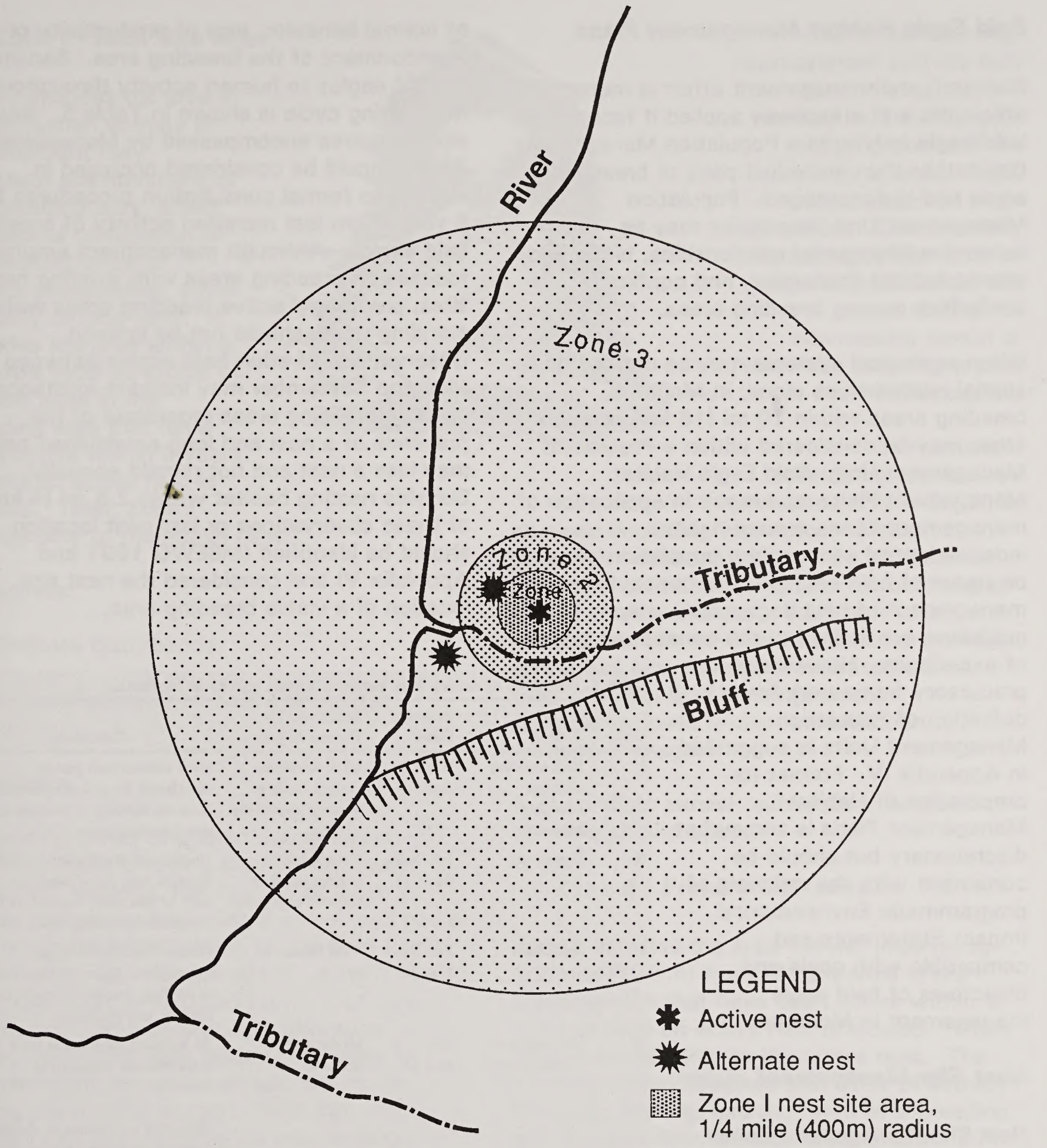


Figure 4. Bald eagle Nest Site Management Zones. Zones are applied to every current and future bald eagle nest site in Montana, in the absence of Habitat Management Plans or other site-specific attention.

Bald Eagle Habitat Management Plans

Research and management effort is more efficiently and effectively applied if focused on bald eagle *habitat* in a Population Management Unit rather than individual pairs or breeding areas and is encouraged. Population Management Unit boundaries may be determined by spatial relationships, biotic and abiotic habitat similarities, and conflict similarities among breeding areas.

Often ecological systems may be defined on spatial relationships alone; in Montana, breeding areas within 10 mi (16 km) of each other may be considered within a Population Management Unit. Bald Eagle Habitat Management Plans may result in application of management zones around habitat, independent of seasonality, population density or status of bald eagles. This concept for management of bald eagles is new and guidelines are limited to the conceptual by lack of experience. However, a precursory framework for definition of Population Management Units is suggested in Appendix IV. Format for preparation of Habitat Management Plans is somewhat discretionary but should be consistent with the rationale of programmatic Environmental Impact Statements and compatible with goals and objectives of bald eagle management in Montana.

Nest Site Management Zones

Nest Site Management Zones are concentric, surrounding most recently active and alternate nest sites in the breeding area (Fig. 4). The primary objective of zone management is to minimize human activity near nest sites during sensitive periods of the nesting cycle to avoid disruption of normal behavior, loss of productivity or abandonment of the breeding area. Sensitivity of bald eagles to human activity throughout the nesting cycle is shown in Table 5. Nest sites and area encompassed by Management Zones should be considered occupied in relation to formal consultation procedures for 5 years from last recorded activity of breeding bald eagles. Although management emphasis focuses on breeding areas with existing nest sites, previously active breeding areas with no standing nests should not be ignored. Observations of adult bald eagles between May and September may indicate existence of suitable breeding areas regardless of the presence of a nest and long established pairs may lose a nest and not rebuild annually. Suitable nesting habitat within 2.5 mi (4 km) of these observations or last nest location should be identified (MBEWG 1991 and Appendix V) and considered the nest site location of a viable breeding area.

Table 5. Sensitivity of nesting bald eagles to human activity in Montana.

Phase	Activity	Inclusive Dates	Sensitivity To Human Activity	Comments
I	Nest building includes courtship behavior	Feb 1 to April 15	Most sensitive period; likely to respond negatively.	Most critical time period manifested by nest abandonment. Nest site tenacity is weakest in new breeding areas.
II	Egg laying	Feb 7 to April 15	Very sensitive period; likely to respond negatively.	Human activity of even limited duration may cause desertion, not only of nest sites, but also of long established breeding areas.
III	Incubation	Feb 7 to May 30	Very sensitive period.	Flushed birds leave eggs unattended. Eggs are susceptible to cooling, loss of moisture, over heating, and predation.
IV	Hatching and rearing young	May 1 to Aug 15	Moderately sensitive.	As hatching approaches most birds become tenacious to clutches. Generally uncommon to abandon a nest after young have hatched. First half of nestling period, unprotected young are most susceptible to elements.
V	Fledging	June 15 to Aug 15	Least sensitive.	Nestlings may miss feedings which may affect survival of young birds. Risk to young prematurely leaving nest due to disturbance.

Zone I - Nest Site Area

Zone I includes the area in which human activity or development may stimulate abandonment of the breeding area, affect successful completion of the nesting cycle or reduce productivity, either annually or long-term. It includes the area within a 1/4 mile (400 m) radius of all nest sites in the breeding area that have been active within 5 years or until an active nest is located. Then, Zone I applies only to the active nest.

Objectives:

1. Eliminate disturbance.

2. Maintain or enhance nest site habitat suitability.

Guidelines:

1. Existing levels of human activities can continue if the breeding area has at least a 60% nest success, has fledged at least 3 young during the preceding 5 years, and has a low potential hazard rating on the Bald Eagle Nest Survey Form (Appendix II). Low intensity activities such as dispersed recreation can occur, but high intensity activities such as heavy equipment use, blasting, logging, or concentrated recreation should not occur during the nesting season. High intensity activity can occur during the non-nesting season if designed to minimize potential disturbance and avoid conflicts with bald eagle key use areas.

2. Additional human activity should not occur within Zone I from initiation of nest site selection to one month after hatching, unless the activity is consistent with bald eagle conservation. A short duration (less than one hour), nonrecurring, nonmotorized activity may occur during the late nestling to 2 weeks post fledgling period if the activity is under direct supervision of eagle specialists. Low intensity human activities such as dispersed recreation can occur during the non-nesting period or when the breeding area is not occupied.

3. Permanent development should be prohibited within Zone I of all nests (including alternates). Habitat alteration which may negatively affect the suitability of the breeding area for bald eagles should also be avoided. Such activities include, but are not limited to, timber harvest, prescribed fire, powerline construction, pesticide use, land clearing, stream channeling, levee or dam construction or wetland drainage.

4. If conflicts persist, subsequent levels of planning should ensue.

Zone II - Primary Use Area

Zone II includes the area 1/4 mi. (400 m) to 1/2 mile (800 m) from all nest sites in the breeding area that have been active within 5 years or until an active nest is located. Then, Zone II applies only to the active nest. The Working Group assumes that 75% of activity (foraging, loafing, bathing, etc.) of a breeding pair occurs within the boundary of Zone II (including Zone I).

Objectives:

1. Minimize disturbance.

2. Maintain the integrity of the breeding area.

3. Eliminate hazards.

Guidelines:

1. Low intensity activities such as dispersed recreation can occur, but high intensity activities such as heavy equipment use, blasting, or concentrated recreation use should not occur during the nesting season. Higher intensity activities can occur during the non-nesting season if designed to minimize potential disturbance and avoid conflicts with bald eagle high use areas.

2. Habitat alterations should be designed and regulated to ensure that preferred nesting and feeding habitat characteristics are maintained.

3. Permanent developments that may increase human activity levels during the nesting season should not be constructed within Zone II of all nests (including alternates). If conflicts persist, subsequent levels of planning should ensue.

4. Structures that pose a hazard such as overhead utility lines should not be constructed within Zone II of all nests (including alternates). Existing structures that pose risks of injury or death should be removed or modified.

5. Permanent developments should not be constructed.

6. If conflicts persist, subsequent levels of planning should ensue.

Zone III - Home Range

Zone III represents most of a home range used by eagles during the nesting season. It usually includes all suitable foraging habitat within 2.5 mi (4 km) of all nest sites in the breeding area that have been active within 5 years.

Objectives:

1. Maintain suitability of foraging habitat.

2. Minimize disturbance within key areas.

3. Minimize hazards.

4. Maintain integrity of the breeding area.

Guidelines:

1. Human activities, including permanent developments, should be designed and regulated to minimize disturbance and avoid conflicts with bald eagle key use areas.

2. Human activity should not reach a level where cumulative effects decrease habitat suitability.

3. Habitat alterations should be designed to ensure that prey base and important habitat components, such as perch* trees or screening vegetation, are maintained or enhanced.

4. Pesticides should not be used in a manner which pose a hazard to bald eagles.

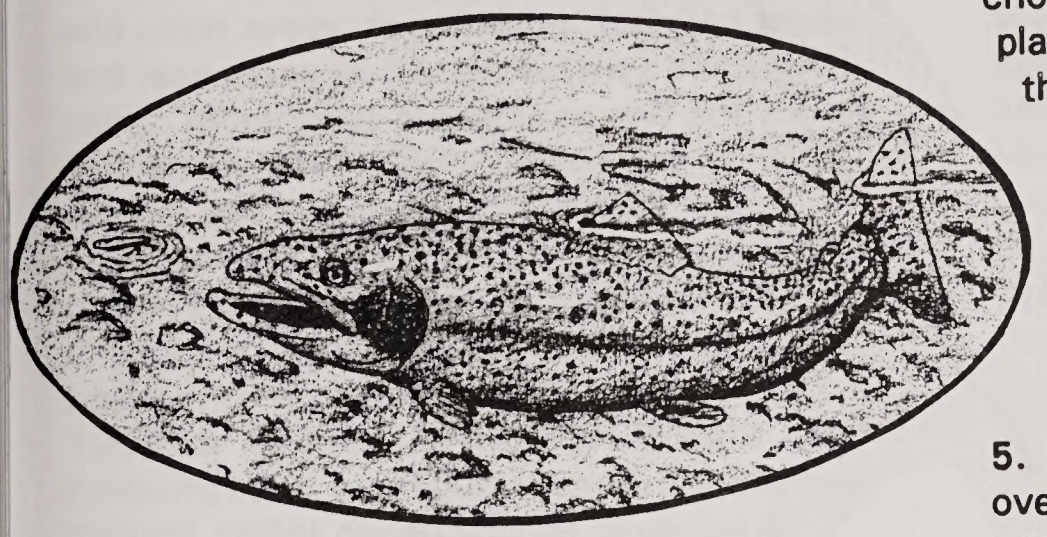
5. Structures which pose a hazard should be located and designed to minimize or avoid risk to bald eagles or their prey.

6. If conflicts persist, subsequent levels of planning should ensue.

Foraging Habitat

Foraging habitat outside Nest Site Management Zones is important. Non-breeders are often excluded from preferred foraging areas by resident nesting bald eagles and extensive foraging flights by resident breeding adults may extend well beyond the 2.5 mi (4 km) radius of Zone III. Thus, quality and quantity of foraging habitat is essential to the entire population, not just the resident breeding eagles. Foraging habitat consists of lakes, rivers, wetlands and meadows which provide open flight paths, perches, security from intrusion/disturbance as well as adequate prey. Management of foraging areas includes protection from contaminants and physical hazards, management of prey base and human activity plus consideration of other factors

which would compromise the ability of bald eagles to forage effectively and safely.



Objectives:

1. Identify foraging habitat outside of Nest Site Management Zones.

2. Regulate use of poisons and eliminate contamination by toxic elements and chemicals in foraging habitat.

3. Maintain water quality and healthy populations of prey species in foraging habitat.

4. Eliminate or reduce collision and electrocution hazards in foraging habitat.

Guidelines:

1. Encourage investigations to delineate foraging habitat.

2. Work with U.S. Environmental Protection Agency and other agencies to reduce or eliminate contaminants in the aquatic environment. Review environmental documents (EAs, EISs) for potential contamination of foraging habitat and submit appropriate responses. Periodically test blood of resident eagles and all eggs recovered for pesticide residues, heavy metals and indicators of toxic exposure and disease.

3. Provide advice and program review to the Montana Department of Agriculture, U.S. Animal and Plant Health Inspection Service, Bureau of Land Management and others regarding the risks of secondary poisoning to bald eagles. Recommend timing restrictions, choice of rodenticides and predacides and placement strategies to reduce or eliminate the risks to foraging bald eagles.

4. Encourage efforts to achieve instream flow reservations. Encourage efforts to protect, mitigate and enhance wetland habitats, water quality and populations of prey species used by bald eagles.

5. Structures that pose a hazard, such as overhead utility lines, should not be constructed. Existing mortality risks should be removed or modified. Seek to route new powerlines away from foraging habitat, and ensure that powerlines are well marked and visible where they cross wetlands. Carcasses of road-killed deer should be removed from rights-of-way to a safe place where eagles can feed without danger of vehicle collision.

6. If conflicts persist, subsequent levels of planning should ensue.

General Breeding Area Plan

A General Breeding Area Plan should be prepared when a conflict exists which cannot be resolved by, is not covered by or is inconsistent with the Nest Site Management Zone Guidelines (pg. 22). General Breeding Area Plans are a refinement of the guidelines and can be completed with available data. Zone boundaries can be constructed in consideration of prevalent conflicts i.e., areas not considered key habitat may be excluded (Fig. 5). Plans should be prepared in consultation with MFWP and USFWS following the outline presented in Appendix VI.

Site-Specific Plan

Site-Specific Plans should be completed for isolated breeding areas > 10 mi (> 16 km) from nearest neighboring breeding area or unique situations (i.e., required for resolution

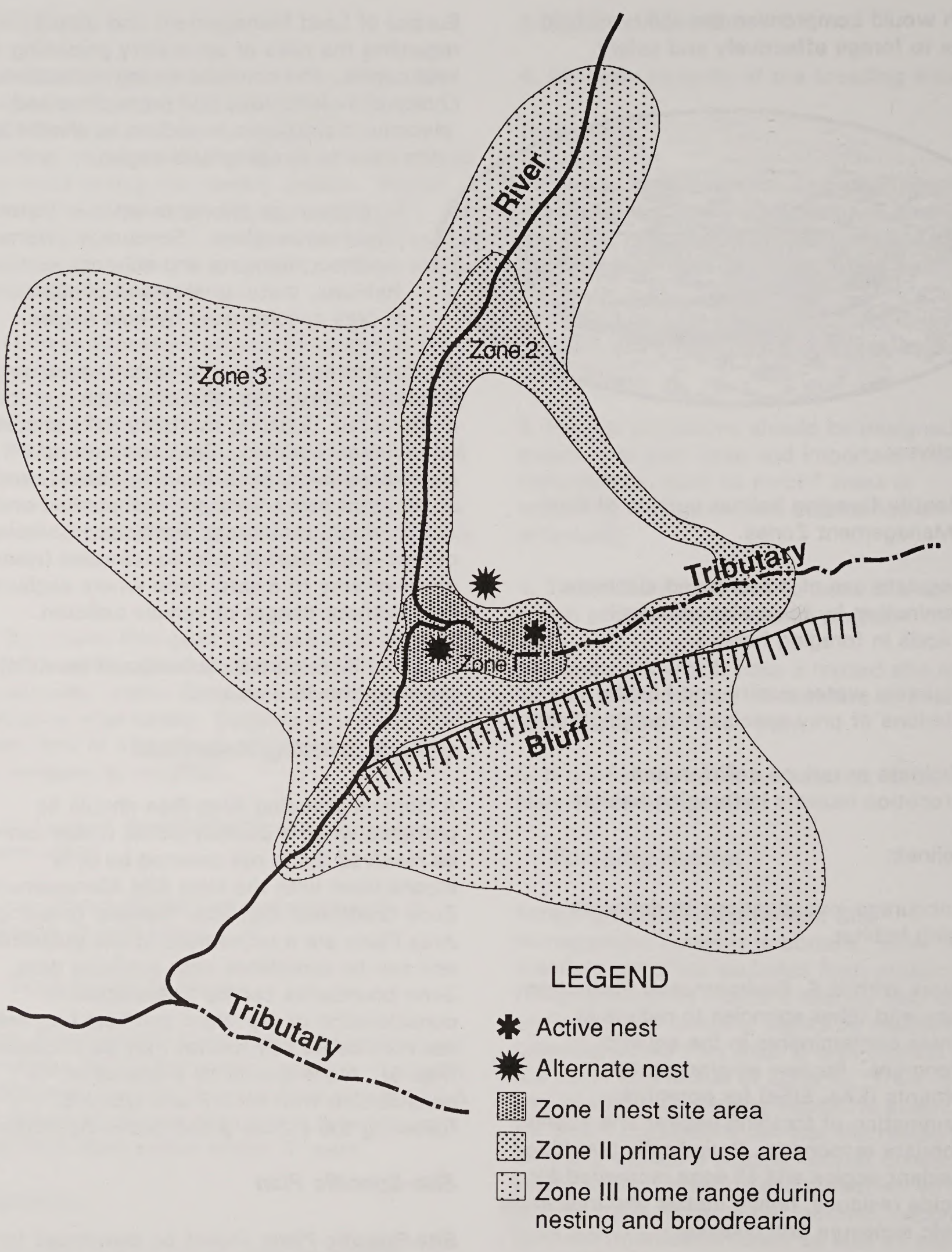


Figure 5. Hypothetical Bald eagle Nest Site Management Zones determined after intensive, site-specific attention.

of intense or immediate conflicts). **Site-Specific Plans should be completed only after an intensive research effort designed to determine home range, activity patterns, perch and roost areas, food habits, foraging areas and responses to human activity of specific pairs.** Monitoring procedures and activities (Appendix VII) for determining site-specific habitat use are applicable to both visual monitoring and radio-tracking. Minimum observation effort needed to adequately describe movements and habitat use is 100 hours with an eagle in sight (Gerrard et al. 1992) or 74 hours of an eagle in sight concentrating on eagles away from the nest (Stangl 1994) depending on situation or technique (telemetry or visual) and number of observers. After data are acquired, the Site-Specific Plan should be prepared in the format of the General Breeding Area Plan (Appendix VI) using steps outlined in Appendix VII as a guide.

Suitable Nesting Habitat

Bald eagle recovery in Montana cannot be maintained by only managing viable breeding areas. Inclusion of habitat with no history of occupancy by breeding eagles but containing potential to do so is necessary to sustain the Habitat Management Objective (pg. 14) over the long term. However, evaluation of potential for unoccupied* habitat to support nesting bald eagles is difficult because of eclectic choice of structures and habitats selected by the species throughout the range. Indeed, bald eagles nest in tall to short trees, cliffs, human-made structures, and the ground; in desert to arctic habitats, from sea level to near alpine altitudes, and in remote to urban conditions. Accordingly, *potential* of an area/habitat to support nesting eagles is unknown but an area that supports nesting eagles is obviously *suitable*. The composite of habitat characteristics of viable breeding areas will serve as a paradigm for evaluating suitability of unoccupied areas/habitat.

The extent of consistency with macro-habitat characteristics (Wright and Escano 1986) and other habitat parameters (Jensen 1988) of viable breeding areas will determine suitability of an unoccupied area or habitat to support nesting eagles. Suitability determination by this method may be conservative because data were gathered from viable breeding areas during early stages of population growth in Montana. Habitat characteristics then identified actually may represent ***optimal***, not just suitable condition because expanding populations tend to occupy the best habitat first (Wilcove and Terborgh 1984). As the data base increases, limits of suitability may expand.

Habitat descriptions of breeding areas (Wright and Escano 1986, Jensen 1988) focus mostly on structural characteristics of the environment and some human activity parameters without consideration of prey base. Habitat suitability models that do consider prey base incorporate only indirect indicators, mostly of abundance of fishes (Peterson 1986, Livingston et al. 1990). However, prey base may be the most important factor in determining density of nesting bald eagles (Dzus and Gerrard 1993), productivity (Hansen 1987) and probably even presence. Evaluation of nesting habitat suitability should therefore include more emphasis on direct measures of food availability.

Objective:

Identify suitable nesting habitat for bald eagles in Montana.

Guidelines:

1. A "Habitat management guide for bald eagles in northwestern Montana" (MBEWG 1991) provides a framework for identifying and managing bald eagle habitat and includes descriptions of important habitat characteristics, silvicultural options for suitable bald eagle nesting habitat and suggestions for assessing suitable bald eagle habitat. These guidelines may be used to identify and manage suitable but unoccupied bald eagle nesting habitat.

2. Descriptions of macro-habitat components of viable breeding areas in Montana are available in Wright and Escano (1986). A summary is contained in Appendix V. These data should be used for preliminary identification of suitable nesting habitat. Areas under consideration that contain habitat component values within limits of those described for viable breeding areas may be classified as suitable nesting habitat. Suitable nesting habitat should be surveyed on an alternate year basis. Suspected nesting areas will have survey priority and should be checked at the earliest opportunity after reports of a nest or summering eagles are received.

3. The Working Group will refine and distribute to appropriate agencies updated guidelines for identification of suitable nesting habitat that include prey base evaluation procedures and productivity assessment. Land management agencies will be responsible for mapping suitable habitat on their respective lands. The Working Group will compile information on suitable sites, identify areas with potential for upgrading or creation of suitable nesting habitat, set priorities and provide justification for intensive management to maintain the Habitat Management Objective on a Recovery Zone basis.

Objective:

Maintain and enhance suitable nesting habitat.

Guideline:

1. Management of suitable nesting habitat is similar in concept to those for viable breeding areas (see Nest Site Management Zones, pg. 22), except for the element of short-term human activity. Nonpermanent human activities are not critical in unoccupied habitat. Management Zones may be implemented around probable nest trees (Appendix V) in delineated suitable nesting habitat to secure habitat for an expanding population.

2. Employ silvicultural procedures to maintain or enhance bald eagle nest stands.

Wintering and Migration Habitat

Management of bald eagle seasonal habitat should focus on 3 habitat components and human disruptions of each (Martell 1992). Presence and abundance of food usually associated with open water, availability and distribution of foraging perches, availability of secure night roost sites and freedom from human harassment dictate amount and extent of use of specific wintering grounds and areas used during migration.

Bald eagles wintering in Montana tend to congregate near bodies of water and roost communally. Major rivers and large lakes constitute the majority of winter habitats used although temporary presence of high quality foods may entice eagles to areas far removed from aquatic zones. Wintering eagles are often observed in uplands, foraging on offal and carcasses associated with late ungulate harvests and big game wintering grounds. Eagles may travel several miles to roost sites. Working Group members are often alerted to small, ephemeral concentrations of eagles associated with calving and lambing operations in January and February.

Roost sites are usually located in stands of mature or oldgrowth conifers or cottonwoods. For purposes of management, a communal roost is defined as an area usually less than 10 acres in size that contains $\geq$6 bald eagles on any given night. Critical roost* sites are defined as exhibiting traditional use for $\geq$5 yrs. and contain $\geq$15 eagles per night for $\geq$14 nights per season (USFWS 1983). No critical winter roost sites have been identified in Montana although over 600 bald eagles may winter in Montana (Flath et al. 1991). A vital roost* site is any communal roost that does not meet criteria for critical status but has local or regional significance in terms of public interest, unique features or importance to the local population of bald eagles. For instance, a communal roost containing 10 eagles for 1 week in an urban, high profile situation may require intensive management attention to appease public concerns. A communal roost located in an area with no other roosting opportunities and geographically isolated from other wintering aggregations may be vitally important to eagles using the site (e.g. a mature timber stand on the eastern prairie).

Bald eagles exploiting kokanee at autumn concentrations are mostly migrants from Canada (McClelland et al. 1982, Restani and Madden 1992) but local eagles also congregate at spawning runs (Restani and Harmata 1993). Although the food base is exotic, it is no less important to eagles. Coincident increases in the regional breeding population may be primarily due to exceptional survival of juvenile and immature eagles, facilitated by access to an abundant, available food base at autumn kokanee runs (Newton 1979, McClelland et al. 1982). Such runs may replace once plentiful natural food sources such as bison (*Bison bison*) and elk (*Cervus elaphus*) carrion and salmon of the Columbia River watershed no longer available (Spencer et al. 1991). Critical roost sites associated with autumn concentrations have up to 7 secondary roosts (Restani and Harmata 1992).

In eastern Montana, vernal migrant bald eagles are usually associated with waterfowl concentrations along the Yellowstone River (Harmata 1984). In the west, eagles are mostly associated with areas supporting large populations of newly emerged Richardson's ground squirrels (*Spermophilus richardsonii*) (e.g. Caton et al. 1989). Critical vernal roost sites are suspected along the lower Yellowstone River but only one has actually been identified. Several secondary roost sites (less use than critical) have been identified in the western portion of the state.

Risks to migrant eagles involve mostly exposure to lead poisoning (Pattee and Hennes 1983), secondary poisoning from insect and predator control programs (Henny et al. 1987), collisions and electrocutions associated with power transmission (Olendorff et al. 1981) and loss of perching, foraging and roosting opportunities due to human disturbance (Fraser 1985). Management of migrant bald eagles should focus on elimination or mitigation of these risks. Guidelines follow those of Martell (1992) with some modifications.

Objective:

Identify bald eagle concentrations and flyways during autumn, winter and spring and institute spatial and/or temporal restrictions where human activity is disruptive.

Guideline:

1. Encourage and support research to identify and quantify use and location of seasonal concentrations of bald eagles.

2. Establish buffer zones of 1/4 mi (400 m) around high-use foraging areas with temporal restrictions from sunset to 1000 hrs (10:00 a.m.) in areas of high human use or establish site-specific modifications based on research findings (e.g. Restani and Harmata 1993).

3. Diurnal perching areas may not always be associated with primary foraging areas. If separate, buffer zones of 1/8 to 1/4 mi (200 to 400 m) around concentrated or high-use perches should be imposed, dependent on existent vegetative screening. Temporal restrictions should be consistent with seasonal residency. Removal of trees, especially snags ≥12 in (1.08 m) within 100 ft (33 m) horizontal or 1/4 mi (400 m) elevational rise of >30° from shoreline should be discouraged on private land and prohibited on federal and state land. Single trees in upland foraging areas devoid of elevated perch sites should be retained.

4. Promote silvicultural practices that will provide perches of adequate number, location and size in perpetuity.

Objective:

Encourage provision of a safe food base for migrating and wintering eagles.

Guidelines:

1. Carrion is a major source of winter food for eagles. County health standards often require domestic livestock carrion be buried. Frozen ground may preclude burial which is usually unnecessary as there is little hazard of disease and no odor in winter. Where not in conflict with grizzly bear (*Ursus arctos*) or wolf management, counties should be encouraged to amend regulations to allow livestock producers to leave or place opened, domestic livestock carrion in areas away from human habitation where it may be used safely by eagles and other scavengers. Most carcasses are consumed after only a few days. Livestock expired from ingestion or administration of drugs, sedatives or poisons should *not* be presented.

2. Spawning runs of kokanee, trout, whitefish (*Prosopium williamsonii*), suckers (*Catastomus spp.*) and other species provide an important food source for migrating eagles. Harvesting and other impacts on these populations should be regulated.

3. During spring migration, bald eagles prey on ground squirrels that have recently emerged from hibernation. Strychnine (now banned for above-ground use) and organophospate poisons used to control ground squirrels are hazards to eagles. Eagles may succumb to secondary poisoning by feeding on squirrels that have ingested poisons. Rodent control programs using toxicants should be prohibited prior to 30 April, to provide safe passage for migrant eagles.

4. Areas of winter and early spring waterfowl concentrations are important to wintering and migrating eagles. In general, efforts to enhance existing wetlands and development of new ones should be supported.

5. Encourage adoption of steel shot in Canada and use of solid point .22 cal. ammunition for varmint shooting. Hollow point projectiles fragment within the animal to a greater extent than solid, posing a threat to eagles (and other wildlife) scavenging carcasses.

6. Require all raptor rehabilitators to report eagles sick or killed by lead poisoning immediately to USFWS and MFWP.

7. Provide perch structures within 300 ft (90 m) of shore and plant deciduous trees beside them in areas where eagles congregate and have few or no natural perches. Locate perches unobtrusively, to minimize potential for shooting. Such areas may include prairie grasslands, sagebrush (*Artemisia spp.*) steppe, reservoirs or wetland mitigation areas (created wetlands) where winter livestock carrion is available, ground squirrels abound in spring, or fishes spawn and waterfowl congregate seasonally.

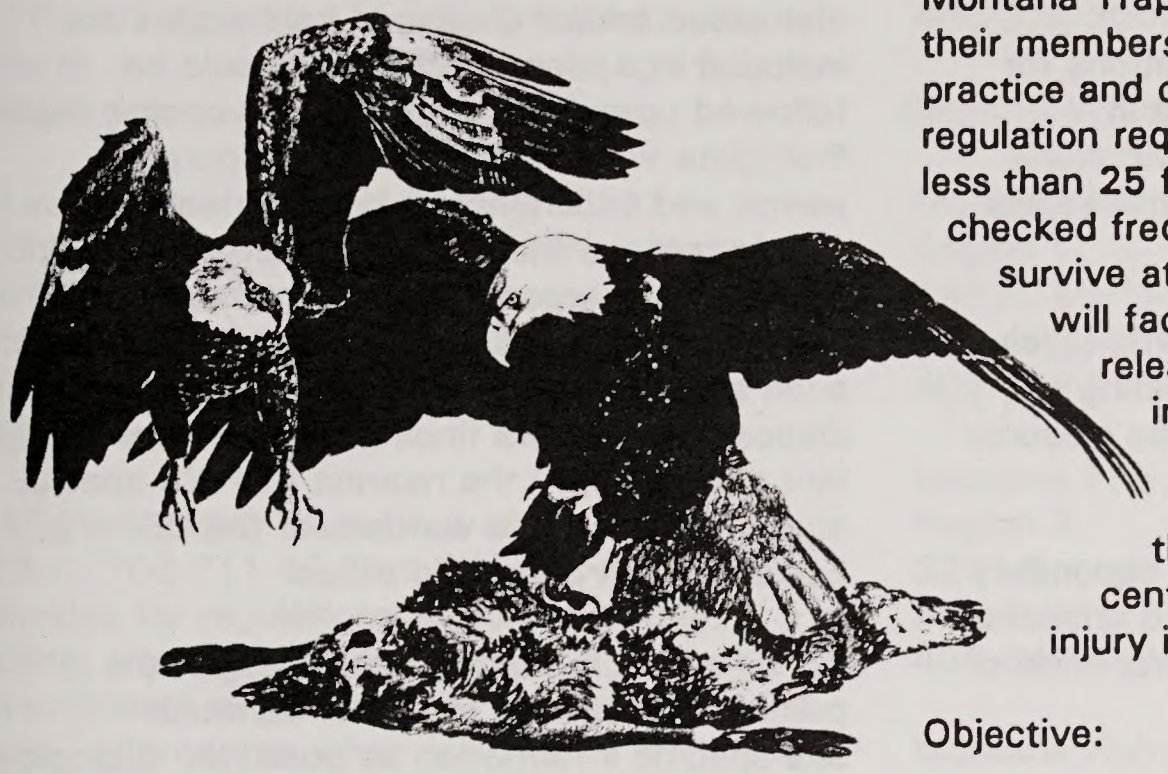
Objective:

Minimize the risk of bald eagle injury and mortality during the winter and migration periods.

Guidelines:

1. Remove road-killed animals from road and railway edges. Eagles are attracted to carrion

along roadsides during winter months. Eagles are vulnerable to oncoming high-speed traffic, especially when gorged, ambient temperatures are well below freezing and wind is calm. Carrion should be removed to areas away from public travel where eagles may feed undisturbed and in safety.



2. Identify powerlines and poles which pose an electrocution or collision threat to eagles. A threat exists where lead and/or ground lines are placed so that eagles may touch both simultaneously, where transformers are placed in elevated terrain, and where lines cross flight paths.

The greatest threat is from distribution lines with less than 69,000 watt capacity. Such poles can be easily modified. Responsible power companies should be contacted and requested to modify the poles in question. Poles near feeding areas are most likely to be used as perch sites and need immediate evaluation. Two main considerations for making powerlines safe for eagles are: (1) modification of existing lines which pose electrocution and collision hazards and (2) proper design of new facilities (Raptor Research Report No. 4, Olendorff et al. 1981).

3. Encourage all hunter safety instructors to include a section on raptor protection in their courses. Educating young hunters about the value of raptors and the fact they are protected by federal and state law may help reduce the incidence of eagle shooting.

4. Support efforts to eliminate placement of leg-hold traps near sight baits. Eagles are vulnerable to such trap sets, intended for predators and furbearers. Encourage the Montana Trapper's Association to educate their members about the need to eliminate this practice and check sets daily. Support a regulation requiring that traps not be placed less than 25 ft (8 m) from sight baits and be checked frequently. Captured eagles can survive at least 1 day and quick release will facilitate survival. Encourage release of eagles with toe/foot injuries if they can become airborne. Chances for survival with a foot injury are greater in the wild than at rehabilitation centers where management of the injury is problematic.

Objective:

Identify and provide protection for communal roosts.

Guidelines:

1. Encourage research to identify and describe roost site locations, duration and intensity of use (e.g. Kiester and Anthony 1983).

2. Promote confidentiality of roost sites. Photographers, media and public are drawn to sites once revealed.

3. Strive to maintain visual, temporal and spatial integrity of the roost site in order to provide for short- and long-term use by bald eagles. Establish temporal and spatial closures around critical and vital roost sites. Area within 1/4 mi (400 m) of critical and vital roosts should be closed. Human activity beyond 1/4 mi (400m) may be disruptive if above the roost site (i.e. on a bluff adjacent to the roost). In such cases, methods to provide visual screening from the roost site should be explored and based on onsite inspection and recommendations of Working Group biologists.

Closures for autumn roosts should extend from 1 October to 1 January, for winter roosts from 15 October to 1 April, for vernal roosts from 1 March to 15 April or determined on actual residency patterns of local eagles. Alternative schemes toward these ends should be encouraged to accommodate human values.

4. Encourage silvicultural prescriptions for long-term availability of roost sites in appropriate habitat. However, silvicultural management should be delayed until eagles are seasonally absent.

5. Prohibit logging, prescribed burns (evaluate on a case by case basis), road building or permanent development within area closures at any time.

6. Strive for similar protection of secondary sites because they may evolve into critical or vital roosts through succession, fire, wind or other catastrophe.

Mortality

On a national level, problems identified as having reduced bald eagle populations are: (1) loss of suitable habitat; (2) reduced reproduction caused by environmental contaminants; and (3) mortality from shooting, accidental trapping, poisoning, diseases, and electrocution. In Montana, specifics on bald eagle injuries and mortalities have not been well documented. However, those recorded implicate all of these problems. Recently, public and agency interest has resulted in increasing numbers of reports of dead and disabled eagles. Information from study of eagle carcasses provides valuable baseline data which identify specific causes of injury or mortality. Identification of causes and rectifying the problems are necessary for the total recovery of the species.

Objective:

Ensure consistency, cooperation, and reporting in the aid of sick or injured specimens and salvage of dead specimens which may be useful for scientific study and religious and cultural purposes for Native American Tribes.

Guidelines:

1. In handling sick or injured eagles, the primary objective is effective, **short-term** treatment and care. Guidelines for handling distressed and/or displaced bald eagles are included in Appendix VIII and should be followed upon locating an injured or sick eagle. Biologists with a USFWS special purpose permit and experience in handling eagles should retrieve the eagle and administer necessary emergency care. The nearest USFWS special agent should be contacted as soon as possible to make arrangements for disposition. Others finding an injured or sick bird should notify the nearest USFWS special agent, MFWP game warden, or the USFWS Ecological Services field office.

2. When encountering a dead eagle, the primary objective is to gather as much site-specific information as possible. Biological materials should be preserved in the best possible state for analysis of cause of death. Only those persons authorized by USFWS and MFWP permits or federal and state biologists, when acting in the course of official duties, may possess eagles. Others should contact the nearest special agent, game warden, USFWS, or MFWP personnel. The form, "Procedures for Reporting Eagle Mortalities" (Appendix IX), should be followed and the form completed and submitted with the carcass when a dead eagle is found.

3. To facilitate the collection and distribution of eagle carcasses and parts to Native American Tribes for religious and cultural purposes, the guidelines contained in Presidential Documents (Appendix X) should be followed.

Objective:

Ensure proper handling of young eagles following nest destruction and emphasize law enforcement to ensure conservation of the bald eagle.

Guidelines:

1. Follow guidelines in Appendix VIII for young eagles displaced by nest destruction.

2. Develop and conduct public education programs designed to reduce illegal shooting of bald eagles.

3. Report violations of any of the following acts to the nearest USFWS special agent or MFWP game warden as listed below.

• Lacey Act of 1900 (16 U.S.C. 3371) prohibits transportation of wildlife or their parts or products taken or possessed illegally, across state or foreign boundaries and Indian reservation boundaries where codified regulations exist.

• Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-711 40 Stat. 755) as amended, provides for regulations to control taking, selling, transporting, and importing international migratory birds, their nests, eggs, parts, or products when such items are included in terms of conventions between the USA, Canada, Mexico, and Japan.

• Bald Eagle Act of 1940 (16 U.S.C. 668-688d; 54 Stat. 250) as amended, provides for the protection of bald eagles by prohibiting the taking, possession, and commerce of these birds, except under certain specific conditions.

• Endangered Species Act of 1973 (16 U.S.C. 1531-1543; 87 Stat. 884) P.L. 93-205 as amended, provides for the conservation of threatened and endangered species of fish, wildlife, and plants by federal action and by encouraging the establishment of state programs. It prohibits the unauthorized taking, possession, sale, transport, import, export, delivery, or receiving of any endangered species.

USFWS Special Agents in Montana:

U.S. Fish & Wildlife Service
Rm. 3319, Federal Building
316 N. 26th Street
Billings MT 59101
406-657-6340

U.S. Fish & Wildlife Service
P.O. Box 3172
3rd St. South, Room 207
Great Falls, MT 59405
406-453-4761

U.S. Fish & Wildlife Service
200 E. Broadway, Room 136
Missoula, MT 59807-7488
406-329-3000

Regional Warden Captains for MFWP:

Montana Fish, Wildlife & Parks
Region 1
490 N. Meridian Road
Kalispell, MT 59901
406-752-5501

Montana Fish, Wildlife & Parks
Region 2
3201 Spurgin Road
Missoula, MT 59801
406-542-5500

Montana Fish, Wildlife & Parks
Region 3
1400 S. 19th
Bozeman, MT 59715
406-994-4042

Montana Fish, Wildlife & Parks
Region 4
4600 Giant Springs Road
Great Falls, MT 59406
406-454-3441

Montana Fish, Wildlife & Parks
Region 5
2300 Lake Elmo Drive
Billings, MT 59105
406-252-4654

Montana Fish, Wildlife & Parks
Region 6
Route 1 - 4Z10
Glasgow, MT 59230
406-228-9347

Montana Fish, Wildlife & Parks
Region 7
Route 1 - Box 2004
Miles City, MT 59301
406-232-4365

USFWS Montana Field Office:

U.S. Fish & Wildlife Service
Ecological Services Division
100 N. Park, Suite 320
P.O. Box 10023
Helena, MT 59601
406-449-5225

Public Information Strategy

Successful recovery of the bald eagle includes public awareness of issues confronting the species and a commitment to address them. Interesting and highly visible information may foster awareness and commitment without promoting or encouraging disruptive activities. Informing people about the function of bald eagles in healthy ecosystems and providing them an understanding of eagle ecology should encourage participation in recovery efforts. Overall strategy must remain flexible enough to incorporate changes that may result from public response.

Objectives:

1. Inform federal and state agency personnel about this plan, bald eagles, and their habitats; enlist their support; and coordinate communication strategies.

2. Educate, motivate, and build support for this plan by increasing awareness and developing appreciation of bald eagles living in healthy ecosystems.

3. Develop a contact list of conservation education people and volunteers to help with the implementation of this plan.

Guideline:

Develop awareness of eagles specifically, and wildlife in general, in the context of biodiversity and ecosystem management, using various communication outlets. Avoid promoting visitation and viewing in unmanaged, critical areas. Vehicles may include:

Newspaper

Support press releases explaining the Recovery and Management Plans and Working Group efforts as well as a series of seasonal releases about bald eagles and their habitat. Information efforts should encourage publication of articles in special sections of state newspapers, highlighting the importance of ecosystem management with the bald eagle as an integral part of the system.

Radio and Television

Public service announcements would inform the public about the Working Group efforts and bald eagles. Subject matter should vary with seasonal ecology. Press releases on specific activities should supplement the announcements. Efforts should be made to place involved personnel on local programs to explain the Management Plan and discuss the importance of bald eagles and their habitat in Montana.

Magazines

Strive to publish an average of at least one feature article to be published annually in Montana Outdoors or other popular outlet. Seasonal followup features should appear quarterly. Short notes about bald eagles for "Hotline" or special sections are often effective. Articles should be encouraged in other magazines or newsletters.

Speaking Engagements

A slide-tape and/or video program has been developed for speaking engagements with regional slides and examples of local projects. Copies have been distributed to federal and state agencies in Montana. The program is available for loan to interested organizations. An accompanying fact sheet should be designed and included. The program should be updated every 5 years.

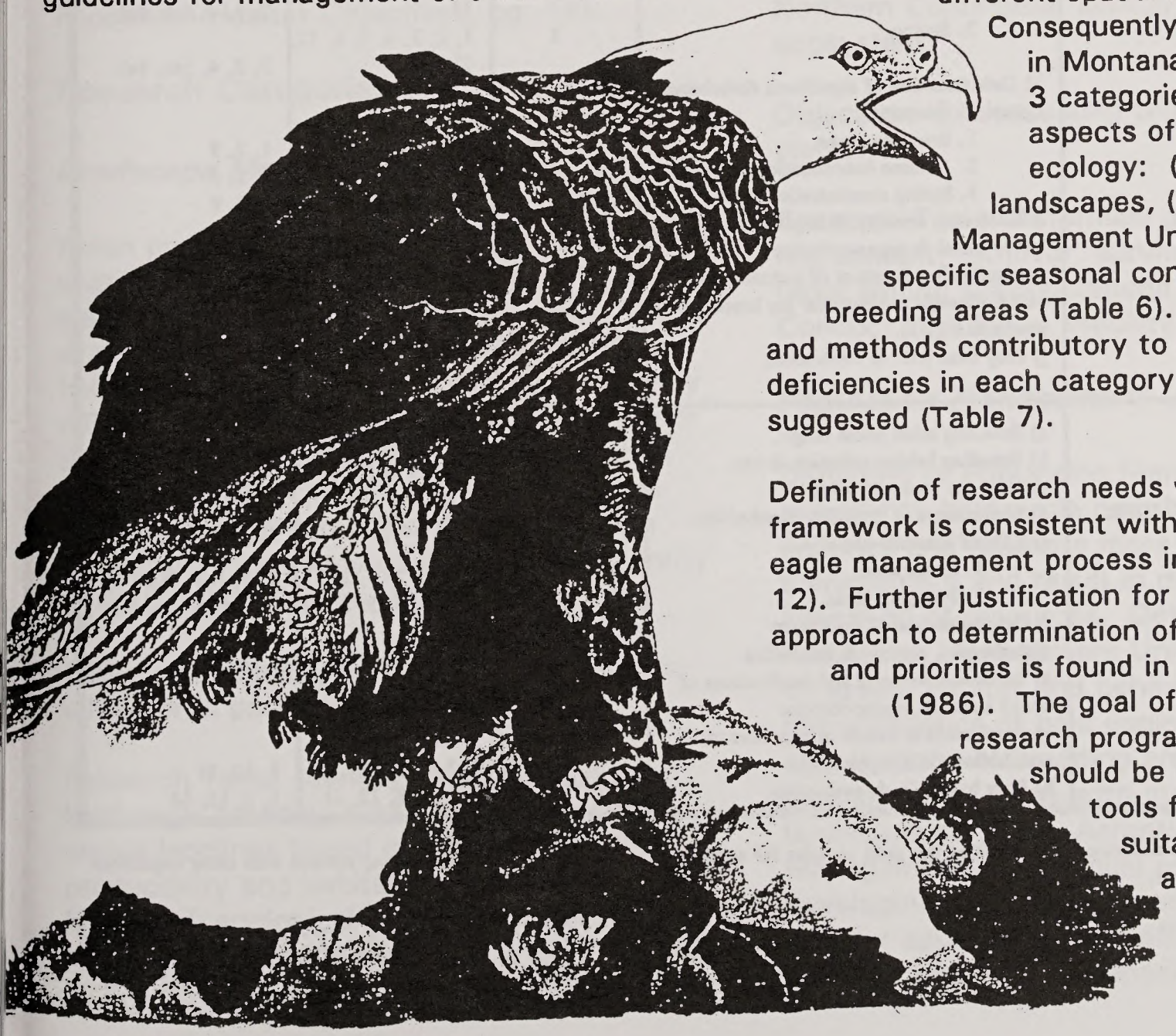
Efforts to inform conservation agency personnel are recommended. Communication

with all resource management agencies is important for effective management of the bald eagle. Working Group participants should present brief programs at agency meetings. Volunteers who are trained and knowledgeable can present a summary of this plan along with other information about bald eagles in Montana to other public gatherings.

Present programs on bald eagles using slide shows, handouts, raptor identification brochures, and posters to school and environmental groups, sportsmen clubs, guides and outfitters, local government officials, and landowners. Promote eagle identification and information to hunter education classes and instructors and design a color poster for extensive distribution.

Landowners

"Living With Bald Eagles" (Magaddino 1989) discusses habitat on private land and presents guidelines for management of those habitats.



Appreciation awards such as Working Group Award, bald eagle print and plaque of recognition should be pursued for landowners who maintain or enhance habitat or otherwise promote the conservation of bald eagles. Coverage of the event by the media should be encouraged.

RESEARCH NEEDS AND PRIORITIES

Achievement and maintenance of Recovery Goals (USFWS 1986) are contingent on adequate information concerning bald eagle populations, distribution, habitat, behavior and effects of human activity. Research needs identified for Montana are consistent with those identified by Henny and Anthony (1989) for bald eagles in the western U.S. but are more specifically defined and prioritized here.

Long-term conservation of bald eagles depends on definition, delineation and integrated management of habitat units of different spatial scale. Consequently, research needs in Montana are assigned to 3 categories related to aspects of bald eagle ecology: (1) regional landscapes, (2) Population Management Units, and (3) site-specific seasonal concentration and breeding areas (Table 6). Specific projects and methods contributory to resolving data deficiencies in each category are also suggested (Table 7).

Definition of research needs within this spatial framework is consistent with that of the bald eagle management process in Montana (pg. 12). Further justification for a spatial approach to determination of research needs and priorities is found in Wiens et al. (1986). The goal of the overall research program in Montana should be development of tools for maintaining a suitable environment at each spatial level that will promote

Table 6. Research categories, objectives and priorities for bald eagles in Montana.

Research Category	Objectives	Priority	Justifications[1]	Methods[1]
LANDSCAPE MOSAIC	a) I.D. aggregates of breeding pairs, map attribute isoclines; establish circumstances of pioneering, genetic link to other populations, & population viability.	1	3, 5, 9, 10, 14	6a, 7, 12, 13
	b) Adult turnover; site fidelity.	2	5, 9, 10, 14	5a, 6a
	c) Mortality: percent, age specificity, agents, location, timing.	2	3, 5, 7, 9, 10, 11, 14	3, 5, 7, 9, 10, 11
	d) Long-range movements of juveniles & subadults.	3	2, 3, 4, 5, 7	5bc, 6ab
POPULATION MANAGEMENT UNITS	a) Breeding adult home range.	1	1, 2, 3, 4, 5, 8, 10, 13	1, 2, 3, 5a, 6ab, 7
	b) Breeding habitat selection & use.	2	1, 2, 3, 4, 5, 8, 10, 13	1, 2, 3, 5a, 6ab, 7
	c) Nest site characteristics.	2	1, 3, 4, 13	1, 2, 7
	d) Long-range movements of juveniles & subadults.	2	2, 3, 4, 5	5abc, 6ab
	e) I.D. of seasonal migration corridors.	2	2, 6	1, 2, 5abc
	f) I.D. of seasonal use areas;			
	1. Roost sites,	1	1, 2, 3, 4, 5, 13	2, 3, 5ab, 6ab
	2. Foraging areas.	1	1, 2, 3, 4, 5, 13	2, 3, 5ab, 6ab
	g) Ecology of seasonal concentrations;			
	1. Autumn,	1	1, 2, 3, 4, 5, 13	2, 3, 4, 5ab, 6ab
	2. Winter,	1	1, 2, 3, 4, 5, 6, 12, 13	2, 3, 4, 5ab, 6ab
	3. Spring.	2	1, 2, 3, 4, 5, 6, 12, 13	2, 3, 4, 5ab, 6ab
	h) Determination of significant disturbances, agents, & intensities;			
	1. Breeding areas,	1	1, 3, 10, 12	1, 2, 9
	2. Autumn concentration areas,	1	1, 3, 10, 12	1, 2, 9
	3. Spring concentration areas.	2	1, 3, 10, 12	1, 2, 9
	i) Incidence, severity & implications of heavy metal & organochlorine contamination & extent of exposure to anticholinergic compounds[2] for breeding adults & h (1-3).	3	3, 7, 9, 10, 11, 13	8, 10, 11
	j) Prey base I.D. & evaluation.	1	2, 3, 4, 5, 8, 12, 13	1, 2, 13, 14
SITE-SPECIFIC BEHAVIOR AND HABITAT USE	a) Breeding adult home range.	1	1, 2, 3, 8, 10, 13	1, 2, 3, 5a, 6ab, 7
	b) Breeding habitat selection & use.	1	1, 2, 3, 8, 10, 13	1, 2, 3, 5a, 6ab, 7
	c) Nest site characteristics.	3	1, 4, 13	1, 2, 7
	d) Movements of juveniles & subadults.	3	2, 3, 4, 6	5abc, 6ab
	e) I.D. of seasonal use areas;			
	1. Roost sites,	2	1, 3, 4, 5, 8, 13	2, 3, 5ab, 6ab
	2. Foraging areas.	1	1, 2, 3, 4, 5, 8, 12	2, 3, 5ab, 6ab
	f) Determintation of significant disturbances, agents, & intensities.	1	1, 3, 4, 10, 12	1, 2, 9
	g) Incidence, severity and implications of heavy metal & organochlorine contamination & extent of exposure to anticholinergic compounds[2].	3	3, 7, 9, 10, 11, 13	8, 10, 11
	h) Prey base I.D. & evaluation.	1	2, 4, 5, 8, 12, 13	1, 2, 13, 14

[1]See Table 7.

[2]Contaminant issues are addressed in monitoring but most samples for analysis are most logically obtained during reseach with other objectives where eagles are handled.

Table 7. Methods and justifications for priority bald eagle research in Montana (Table 6). Numbers of methods and justifications are applicable to reference in Table 6 and do not imply association.

Methods	Justifications
1. Data synthesis from other studies	1. Basic data need for management zones, artificial structure, human activity restrictions.
2. Passive observation	2. I.D. of seasonal feeding/roosting areas
3. Inventory/census flights	3. Determine priority of protection & mitigation activities.
4. Ground surveys	4. Quantitive determination of potential habitat to meet recovery goals.
5. Radio telemetry	5. Local & regional importance for maintenance of viable populations.
a. Tailmount radios	6. Determine origin of recruits, importance of migrants.
b. solar powered backpack radios	7. I.D. age/sex specific mortality extent & causes.
c. Satellite located radios	8. I.D. frequency & extent of periodic home range/habitat use shifts.
6. Marking studies	9. Establish health of population.
a. banding (metal USFWS)[1]	10. Establish minimums for survival, attainment & maintenance of management objectives.
b. colormarking (patagial tags, colorbands)	11. I.D. anthropogenic population depressors
7. Geographic Information Systems	12. I.D. reasons for population shifts
8. Blood sample analysis	13. Evaluate habitat changes.
9. Controlled, quantitave experiments on stable populations	14. Data needed for evaluation of population dynamics
10. Carcass examination	
11. Laboratory analysis	
12. Population Viability Analysis	
13. Habitat measurements	
14. Electroshocking, creel census, seine netting, big game & waterfowl surveys, small mammal capture	

[1]Handling and release for any reason (i.e. Methods 5, 8) will involve at least USFWS banding.

continued population size and productivity at desired post-recovery levels (see Population/Habitat Objectives, pg. 14).

Research Categories

Landscape Mosaic

Avian population viability may be affected by spatial relationships among demes or subpopulations (Whitcomb et al. 1981, Villard et al. 1992). Maintenance of the Montana bald eagle population at recovered levels may depend on distribution of subpopulations that are more stable, resilient or productive than others, including those outside of Montana. Identification of attributes influencing high productivity may provide direction and priority of large scale management action.

Objective: Identify ecosystems contained in whole or in part in Montana.

Research Task: Identify, describe and map bald eagle breeding areas statewide; map status isoclines based on phenology, productivity and habitat. Determine common biological, ecological or spatial attributes that influence population status on a large scale and dynamics on a regional scale and assign to an ecosystem (e.g. Greater Yellowstone, Northern Continental Divide) or define ecosystem.

Objective: Evaluate long-term species viability.

Research Task: Determine gene flow, recruitment, turnover, survival and mortality rates among subpopulations or ecosystems. Conduct Population Viability Analysis.

Population Management Units

Definition of Population Management Units relevant to bald eagle distribution would enhance and facilitate more effective, local management and result in more efficient allocation of resources. Definition of Population Management Units should be based on similar habitat and behavioral characteristics of bald eagles which define aggregations of breeding areas and seasonal concentration areas with more resolution than landscape mosaics. Attention to Population Management Units would result in development of management techniques with broader applicability and efficiency than a series of disjunct, site-specific studies.

Objective: Definition of bald eagle Population Management Units.

Research Task: Analyze in-depth macro- and micro-habitat characteristics, fishery profiles, stream geomorphology, stream flow, habitat associations, human activity types, duration and intensity levels, land/river use patterns plus bald eagle reproductive performance, movements, and habitat use to reveal relative levels of similarity of breeding areas and seasonal concentration areas to define Population Management Unit boundaries (e.g., description of population units in Swenson et al. 1986) (see Appendix IV).

Objective: Evaluate long- and short-term habitat changes and effect of human activity in Population Management Units.

Research Task: (1) Investigate human demographic, development, and recreational trends associated with Population Management Units (e.g. Missouri River Chain of Lakes, Flathead River/Lake, Madison-Upper Missouri River Complex) and project and evaluate impacts, (2) initiate studies of prey base and determine influence of species diversity, abundance, distribution, behavior, etc., on availability and resultant effects on occupancy, density, behavior and productivity of resident bald eagles.

Site-specific Behavior and Habitat Use

Most conflicts immediately impact only a few breeding or seasonal use areas. Resolution is usually based on determination of impacts which influence use of various habitat attributes by bald eagles, as well as pair-specific behavior.

Breeding Areas

Coincident with needs to manage immediate conflicts, there is a critical need for guidelines for determining appropriate monitoring method and effort for adequate description of seasonal home range and use areas of specific bald eagles. Past research has not addressed this question specifically although some information exists (e.g., Gerrard et al. 1992, Stangl 1994).

Objective: Determine appropriate monitoring techniques and observational effort for investigations of home range and key use areas and develop monitoring guidelines applicable to breeding areas in similar habitats (i.e. lakes, rivers, or reservoirs in montane, foothill or plains life zones or Population Management Units).

Research Task: Monitor radio-tagged individuals in conjunction with independent visual location efforts to determine efficacy of home range/movement determination based on visual locations alone, in different habitats and conditions.

Objective: Determine home range, activity patterns, foraging ecology and movements of resident adult eagles.

Research Task: Auxiliary mark resident eagles and monitor appropriately.

Objective: Determine true effects of human activity under a variety of conditions for more rational management.

Prevailing concepts of effects of human activity on bald eagles need to be re-evaluated in the context of the growing Montana eagle population and demonstrated tolerance of human activity. Although past restrictions of human activity to protect bald eagles have been effective and generally adhered to, reactions of bald eagles to human activity need to be more critically evaluated in times of increasing demands on habitat. Well-funded, politically-supported assaults on bald eagle habitat will increase in the future and may be parried only with good quality, quantitative data rather than subjective estimates of managers and biologists.

Research Tasks: (1) Intense site-specific analysis before, during and after conflicts, or (2) controlled experiments of induced disturbance on a nonendangered population (i.e. Canadian).

Seasonal Concentrations

Seasonal availability of nonnative food (e.g. kokanee at Glacier National Park and Hauser Lake) in the long-term may be critical for maintenance of recovered regional eagle populations, having replaced once abundant but extinct natural food. Ungulate wintering areas and ground squirrel and waterfowl concentrations may be of similar importance in winter and spring, respectively.

Objective: Determine importance, distribution, and abundance of seasonal food concentrations for migrant eagles.

Research Tasks: (1) Long-term monitoring of cohorts of identifiable individual (radio-tagged, colormarked) bald eagles associated with seasonal concentrations to determine origin, movements, and survival in addition to local habitat and roost site use, (2) monitoring of eagles beyond crash or extinction of associated food sources (e.g. kokanee, ground squirrels), and (3) weekly census of seasonal concentrations to determine increase, peak and decline in numbers and conditions that contribute to trends.

Objective: Determine location, importance and conflicts associated with seasonal roost sites.

Research Tasks: (1) Remain vigilant for reports of concentrations of wintering eagles, (2) solicit local agency biologists and private conservation organizations to search for and report communal roosts, (3) determine status (critical, vital, pg. 28), (4) evaluate impediments to use (e.g. human activity, structures) or potential hazards (e.g. powerlines, structures) inside and within 1/4 mi (400 m) of periphery of roost sites and along likely flight paths of approach.

Research Priorities

Research priorities (Table 6) are consistent with immediate information needs perceived by management and research personnel and are compatible with current management direction in Montana. Serious data gaps exist in all categories. As information accrues, priorities should change to meet contemporary conflict resolution and resource conservation needs.

One study may provide opportunities to generate data applicable to more than one priority or objective at minimal expense (e.g. nestling banding can provide blood samples and eggs for contaminant monitoring). Table 7 presents methods and justifications for research priorities (Table 6) in Montana.

Guidelines:

1. Encourage research in all categories (Table 6) but avoid duplication of established projects or previous work. Strive for adequate funding of ongoing research projects and future studies (with emphasis on long-term studies such as nestling banding statewide) by actively seeking and encouraging private and governmental financial support.

2. Evaluate progress and management applicability of bald eagle research in Montana by establishing periodic review schedules to evaluate adherence to needs and priorities in Montana.

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GLOSSARY[1]

Active (*breeding area/territory/pair/nest*) - defined by the presence of: 1. an incubating bald eagle(s), eggs, or young, 2. a *nest* constructed during the current breeding season and attended by a pair of bald eagles after 15 April, 3. fresh nesting material in a previously productive *nest*. An active *breeding area/territory/nest* also is *occupied*.

Adult - A bald eagle appearing to possess a predominantly white head and tail (i.e. in adult plumage). Eagles classified as adults at a distance (or unaided eye) may be reclassified as *immature* or *subadult* upon closer inspection, depending on protocol.

Alternate Nest - Any bald eagle *nest* within the breeding area. All alternate nests are extended protection (Zone applications) until an *active nest* is located.

Breeding Area - the geographic area used by a pair of bald eagles during the breeding season. Breeding areas must include some evidence of past reproduction or attempted reproduction but may not include an existing *territory* or *nest* of bald eagles. Size may vary over time. Breeding areas may be *suitable or unsuitable, occupied or unoccupied, active, successful or historical*, or combinations thereof.

Cere - Basal portion of the upper mandible containing the nostrils.

Communal Roost - an area where $\geq$ 6 eagles spend the night within 100 m of each other.

Conflict - any anthropogenic presence or activity that may negatively affect bald eagles directly or indirectly by disturbing individuals, degrading habitat suitability, reducing productivity below normal values, result in abandonment of nest sites, breeding or key use areas, or reducing survival.

Critical Roost - A *communal roost* exhibiting traditional use for $\geq$5 yrs. and containing $\geq$15 eagles per night for $\geq$14 nights per season.

Courtship Nest - a *nest* built or used by nonresident bald eagles external to the *breeding area*, usually during winter or spring. The function of a courtship nest may be to establish or maintain a pair bond or synchronize breeding condition of migrant eagles prior to arrival in the *breeding area*.

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[1] *Terms defined here do not necessarily follow traditional or actual definitions, but are defined here to impart the intent of the Montana Bald Eagle Working Group. Italicized words in each definition indicate terms defined elsewhere in the glossary.*

Delist - the formal process of removing a species from the federal list of *endangered and threatened species*, pursuant to the Endangered Species Act of 1973.

DDT - 1,1,1-trichloro-2,2-bis(p-chlorodiphenyl) ethane.

Disturbance - any human elicited response that induces a behavioral or physiological change in a bald eagle contradictory to those that facilitate survival and reproduction. Disturbance may include elevated heart or respiratory rate, flushing from a perch or events that cause a bald eagle to avoid an area or *nest site*.

Downlist - the formal process of reclassification of a federally *endangered species* to *threatened species* status, pursuant to the Endangered Species Act of 1973.

Ecosystem - any area of nature that includes living organisms and nonliving substances interacting to produce an exchange of materials between the living and nonliving parts. Commonly considered regional in size (millions of hectares) and containing common attributes such as elevation, vegetation, animal communities, weather patterns, soil, geology, hydrology and topography.

Endangered Species - a species that is in danger of becoming extinct in the foreseeable future throughout all or a significant portion of its range.

Fledgling - a *juvenile* bald eagle, mostly over 13 weeks of age, that has taken at least one flight away from the natal *nest* site but is not necessarily absent from the *nest* or *nest site*. Fledglings may be capable of sustained flight but are still dependent on adults for sufficient food. Fledglings will return to and use the natal *nest* as a *perch* and *roost* site and feeding platform.

Habitat - the naturally associated environment in which an animal lives and contains all requisites for survival, health, reproduction, and persistence. Habitat for bald eagles may be considered *suitable* or *unsuitable*, *occupied* or *unoccupied*, or combinations of both.

Historical (*habitat/breeding area/territory/nest*) - that which has some record of use or occupancy by bald eagles.

Home Range - geographic area defined by movements and locations of a bald eagle or bald eagles. Area may be defined annually, seasonally, daily or any part thereof.

Immature - a bald eagle appearing not to possess *adult* plumage. Immature eagles may be associated with an *occupied, active* or *successful territory, breeding area* or *nest*. Often used to indicate any nonadult bald eagle but more strictly defined as one between 1.5 and 2.5 years old. Plumage is often distinctive, exhibiting a white, speckled belly and white inverted triangle on the back. Beak is mostly black but containing streaks of yellow.

Juvenile - A bald eagle less than one year old and characterized by distinctive plumage (McCollough 1989). Definition includes *nestling* and *fledgling* eagles. Juveniles possess plumage that is most often very dark brown and a black beak.

Lacustrine Habitat - associated with lakes and reservoirs; including features characterized by biotic and abiotic associations typical of aquatic or mesic terrestrial environments.

Monitor(ing) - regular, systematic, and long-term effort to examine specifically identified categories of data acquired from surveys to determine the status, health and management needs of the Montana bald eagle population. Monitoring may or may not include research.

National Recovery Areas - Pacific, Southwest, Northern, Southeast and Chesapeak.

Nest - any platform within the *breeding area* that may have been built or used by a bald eagle, usually as a focus for reproductive behavior and activity. Bald eagle nests are usually built by mated pairs, are made of sticks and are situated in trees. Nests may be constructed by single eagles or other species and composed exclusively or in part of grass, forbs or man-made material and situated on cliffs, man-made structures (windmills, utility poles) or the ground.

Nestling - a bald eagle between hatching and leaving the *nest* for the first time under its own volition.

Nest Site - the geographic point location or structure supporting the *nest*.

Nest Site Management Zone(s) - local geographic areas surrounding *active* and *alternate* bald eagle *nests* in which human activities are likely to disrupt normal breeding activity. Zones involve application of spatial and temporal human activity restrictions, progressively less restrictive with increasing distance from the nest site.

Occupied *(habitat/breeding area/territory/nest)* - *Habitat/breeding area/territory/nest* defined by the presence of a pair of bald eagles during the breeding season.

Perch Site - Any place a bald eagle stands during daylight hours (cliff, rock, tree, ground).

Population Management Unit - an area smaller than traditionally defined *ecosystems*, usually associated with one or more rivers, lakes or watersheds, including an aggregation of 2 or more bald eagle *breeding areas* with continuous/contiguous distribution; where local bald eagles exhibit significant similarities in habitat associations, nesting substrate and phenology, food, population dynamics, movements, wintering areas, responses to human activity or other life history characteristics.

Potential (*habitat/breeding area/territory/nest*) - that which may support nesting bald eagles in the future. Because the potential to support breeding bald eagles cannot be reliably assessed in the absence of eagles, the term *suitable* is preferred. Potential may be more precisely assigned by the consistent presence of at least one *adult* bald eagle during the breeding season in an area known not to previously contain a breeding pair.

Productivity - number of young eagles raised to advanced age by a pair of bald eagles, within a *breeding area* or by a population or part thereof, per unit time. Progeny of breeding pairs that have attained advanced age are no less than 7 weeks old. Productivity may be expressed as young per *occupied, active,* or *successful breeding area/territory/pair/nest or population unit*.

Recovered - the designation upon which a species may be removed from the federal list of *endangered and threatened species* and no longer require protection under the Endangered Species Act of 1973. Designation is based upon the best scientific and commercial data available. Criteria for bald eagles to be considered *recovered* are listed in the Recovery Plan for the Pacific Bald Eagle (USFWS 1986).

Recovery - a point at which protection under the Endangered Species Act of 1973 is no longer required. A species may be delisted on the basis of recovery only if the best scientific and commercial data available indicate that it is no longer *endangered or threatened*.

Recovery Zone(s) - regional geographic area(s) designated in the Recovery Plan for the Pacific Bald Eagle (USFWS 1986), a Federal document, for the purpose of applying specific management objectives for the *recovery* of bald eagle populations in the 7-state Pacific States Recovery Area.

Riparian Habitat - associated with rivers and streams; including biotic and abiotic features commonly considered within the 100-year flood plain and including features characterized by biotic and abiotic associations typical of aquatic or mesic terrestrial environments.

Roost/Roost Site - any location where an eagle spends the night.

Subadult - a bald eagle appearing not to possess full *adult* plumage. More strictly defined as one appearing mostly *adult* in plumage and further by being between 2.5 and 3.5 years old. Plumage may possess a dark eye line and dark terminal tail band. Beak is mostly yellow but may be streaked with brown.

Successful (*breeding area/territory/pair/nest*) - site or pair that has produced at least 1 young eagle that is raised to an advanced age. Progeny that have attained an advanced age are no less than 7 weeks old.

Survey(ing) - activity to identify and record pre-determined variables on a selected route or area at specific times. These include aerial or ground based efforts to quantify location, number and reproductive performance of bald eagles in Montana. A form is provided in Appendix II to standardize this effort.

Suitable (*habitat/breeding area/territory/nest*) - term indicating *unoccupied* sites that may support nesting bald eagles in the future. Suitable may be applied to *breeding area/territory/nest* or habitat with a history of use and/or contains characteristics within normal range of those currently *occupied*. The term suitable is preferred over the term potential.

Territory - the portion the *breeding area* defended by bald eagles against other bald eagles and species, not limited to the breeding season. Territory size and location may vary with time. *Breeding area* is preferred over territory in relation to productivity surveys because some breeding eagles may not exhibit territorial behavior or defend any portion of the breeding range while others may defend areas not associated with breeding activity (i.e. winter ranges).

Threatened Species - a species that is likely to become *endangered* in the foreseeable future.

Unoccupied (*habitat/breeding area/territory/nest*) - that which exhibits no evidence of the presence of bald eagles during the breeding season.

Viable Breeding Area - A *breeding area* that has a record of being *active* within the past 5 years.

Vital Roost - A *communal roost* that does not meet criteria as a *critical roost* but has local or regional significance in terms of public interest, unique features or importance to the local population of bald eagles. Roost sites that may be considered vital may satisfy one or all of the following criteria: (1) stimulate high public concern, (2) support the entire local population or (3) provide the only roosting opportunities within the normal, daily foraging/cruising radius of associated bald eagles.

Working Group - The Montana Bald Eagle Working Group.

Young of advanced age - indicates nestling at least 7 weeks old.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

IN REPLY REFER TO:

ES
MAIL STOP 60120

MAILING ADDRESS:
Post Office Box 25486
Denver Federal Center
Denver, Colorado 80225

STREET LOCATION:
134 Union Blvd.
Lakewood, Colorado 80228

MAR 25 1994

Memorandum

To: Field Supervisor, Ecological Services, Helena, Montana

From: Assistant Regional Director, Ecological Services, Region 6

Subject: Montana Bald Eagle Management Plan

By memorandum dated March 14, you requested Regional Office section 7 review of the subject final draft revised management plan. After our review, we concur with your conclusion that the implementation of the plan is not likely to adversely affect the bald eagle, peregrine falcon, grizzly bear, or the gray wolf. We also concur that its implementation will promote the conservation of the bald eagle.

APPENDIX II
BALD EAGLE NEST SURVEY FORM

The bald eagle nest survey form is a two-sided form designed to standardize raptor nesting data collection. Your ease of use, computer storage and data retrieval governed its format. Although completed for the annual Montana bald eagle nesting surveys, the form can be used for recording other raptor nesting data. The following instructions pertain to the bald eagle nesting survey. Individuals responsible for a nest survey will receive copies prior to each year's survey. Complete one form for each bald eagle nest. At the end of the survey period, make a copy for your records and send the original to your bald eagle working group representative.

Section I records general information, including the species and year of survey. The designated territory name and territory/nest number will be entered on the form before distribution.

Section II is a summary of survey results for computer storage and analysis. Working group compilers will complete this section from your survey results. PLEASE LEAVE SECTION II BLANK.

Section III is a table for recording your survey results. The objective is three nest checks per season, pre-egg laying, incubation, and fledgling. Space is provided for including multiple nest checks completed during one nesting period. If insufficient space is available for your comments, use another sheet of paper and attach it to the form.

ALL NEST CHECKS: Record the date, name of observer, and method of survey (ground, boat, fixed-wing, or helicopter). Identify nest condition destroyed (no longer present), poor (deteriorated and unusable), fair (usable), good (fully intact), or new (newly constructed nest).

PRE-EGG LAYING NESTING PERIOD: Under "Findings" record the number and age class (adult, sub-adult, or immature) of bald eagles in nest attendance. Under "Status" record either unoccupied (no adults in attendance), single adult or occupied (two adults in attendance). Under "Comments" record eagle behavior, distances of eagles to nest, presence of other species at the nest, evidence of nest repair, and other important observations.

INCUBATION NESTING PERIOD: Under "Findings" record the number and age class of bald eagles in nest attendance. Identify yes or no, whether an adult bald eagle is in incubating position, or if the adult is off the nest and whether eggs are present. Under "Status" record either active (yes under findings) or inactive (no under findings). Under "Comments" record eagle behavior, distances of eagles to nest, presence of other species at the nest, evidence of nest repair, and any other observations you feel are important.

NESTLING NESTING PERIOD: Under "Findings" record the number and age class of bald eagles in nest attendance. Identify nestling number and age class. Under "Status" record either active (nestlings present) or unsuccessful (no nestlings). Under "Comments" record eagle behavior, distance of eagles to nest, presence of other species at nest and any other observations you feel are important.

FLEDGLING NESTING PERIOD: Under "Findings" record the number and age class of the bald eagles in nest attendance. Identify the number of fledglings present by age class (Appendix Table 1). Under "Status" record either successful (number of fledglings present) or unsuccessful (no fledglings). Under "Comments" record eagle behavior, distances of eagles to nest, presence of other species at the nest and any other observations you feel are important.

Section IV: On the back of the form record known supplemental nesting information. Routine nesting surveys may not generate this type of data. If unknown leave blank, but approximate dates would be helpful. If banding occurred, record band numbers or other marks used.

Section V should be completed by all surveyors. Identify (Yes/No) if the nesting attempt failed. If yes, record date nesting period of failure and the reason for failure, if unknown, so note. Two ratings are requested. One for potential hazards associated with the nest, nest tree, or stand and a second for potential conflicts that might impact the territory. The following examples might help you rate your territories.

Appendix Table 1: Nestling Age Class Codes

1.0 Downies	2.0 Feathers showing	2.9 Completely feathered
1.1 Small white downies	2.1 Mostly downy with some feathers	3.0 Fledged
1.2 Large gray downies	2.3 Downy head, but body feathers out	

Potential Hazard Rating

1. Unlikely that the nest or nest tree will be lost or become unsuitable. For example, nest is secure in a healthy ponderosa pine, no evidence of disease in the stand or understory is not overtopping the nest tree. Alternate nest trees are available in the nest stand.

2. It is likely that the nest or nest tree will be lost or become unsuitable in the foreseeable future. For example, nest in a dead ponderosa pine, nest stand diseased or a dense understory tree layer exists in the nest stand. Alternate nest trees are available in the nest stand.

3. Nest or nest tree is in immediate danger of being lost or becoming unsuitable. For example, inadequate support for nest, nest tree is rotten, and nest tree being overtopped by understory trees. Alternate nest trees are not available.

Potential Conflict Rating

1. Activities that could impact the territory are not occurring now, nor are any planned.

2. Activities that could impact the territory are not occurring now, but are anticipated for the foreseeable future. Examples are subdivisions within 1 mile, road construction within 1/2 mile, timber harvest within 1/2 mile or a very accessible site.

3. Activities that would impact the territory are occurring or planned for the immediate future, e.g., subdivision within 1/2 mile, road construction within 1/4 mile or timber harvest within the nest stand.

Under comments, identify the potential hazard or conflict and include any management opportunities to resolve the hazard or conflict noted.

A space is provided for recording any additional observations or remarks that you feel might be important in the survey or management of this territory. Include comments about the suitability of the survey methods used. Please print your name and date the form. Include your mailing address so that the computer printout of the completed form can be sent to you for checking.

BALD EAGLE NEST SURVEY FORM
19____

I. ID

Territory Name_____ Territory Number _____

Historical Data ____ Survey Results _____

II. SURVEY SUMMARY

Survey:

____(1) Not Checked ____(2) Not Located ____(3) No Occupancy check ____(4) No Activity ____(5) Unknown Outcome

____(6) Complete Survey

Status:

____(1) Unoccupied ____(2) Other Species ____(3) Single Adult ____(4) Occupied ____(5) Active

____(6) Unsuccessful ____(7) Successful ____(8) Inactive ____(9) Unknown ____(A) Found ____(B) New Territory

Nest Condition:

____(1) New Nest #____ ____(2) Good ____(3) Fair ____(4) Poor ____(5) Destroyed Nest #____

Number of Young: _____

III. SURVEY RESULTS

Nesting Period / Date Checked	Survey Method	Nest Condition	Findings	Observer	Comments
Occupancy (3/1-3/31)					
Activity (4/1-4/30)					
Nestlings (5/1-5/31					
Fledgling (6/1-7/15)					

MBEWG /93

IV Supplemental Nesting Information (if known)

Date of adult arrival:_____ Date of adult dispersal: _____

Date of hatching:_____ Date/Number of fledglings at dispersal:_____

Date of fledging:_____ Banding Data:_____

V NARRATIVE INFORMATION

Nesting Failure, date/nesting period failure _____

Reason for failure _____

Potential hazard rating: (low) 1 2 3 (high)

Comments:_____

_____

Potential conflict rating: (low) 1 2 3 (high)

Comments:_____

_____

_____

Observations, remarks, food habits:_____

_____

_____

_____

Prepared by: _____ Phone: _____ Date: _____

Mailing Address: _____

APPENDIX III
BALD EAGLE NEST RECORD FORM

The bald eagle nest record is a form to establish a permanent record of nest locations. The form has been kept simple to facilitate use and is limited to general descriptive information about the nest. The objective is to include sufficient information so that someone unfamiliar with the nest can find it in the future.

The form is self explanatory, but the following may be helpful in filling it out in relation to bald eagles.

The territory name and number should be the official name and number designated by the bald eagle working group.

Record the name of the person who originally located the nest and the date it was first reported, if known.

Identify the nest location to the nearest quarter of a quarter section.

Record the first three digits of latitude and the first four digits of longitude for the southeast coordinates of the 10 minute block involved.

Record the eight-digit hydrologic unit code from the USGS hydrologic unit map for the drainage involved.

Record the tree species the nest is in and if the tree is dead or alive.

Record position on slope using one of the following categories: drainage bottom, lower 1/3, mid-slope, upper 1/3, or ridge top.

Record landownership, identify agency and administrative unit involved, e.g., Forest Service, Spotted Bear Ranger District, Flathead National Forest. If private, identify the landowner, such as Burlington Northern or Schroader Ranch.

Under the "Other" category, record how visible or easy it is to find the nest. Anything you feel is important can be recorded here, landmarks, tree condition, trails, and other information. Be very specific in your directions to the nest and use mileages to action points. Be sure that someone unfamiliar with the area could find the nest with your directions. Attach maps and photos.

Identify the name and scale of the USGS topoquad map attached to the form. On this map identify the nest location with an X, highlight the access route to the nest with a solid line for a road and dashed line for walking. Identify locations from which the attached photos were taken with an arrow toward the nest site.

Record the name of the person filling out the form and date it was completed.

Name _____

Date _____

Agency & Office _____

BALD EAGLE NEST RECORD FORM

Species: _____

Territory name: _____

Territory/nest number: _____

Reported by and date: _____

Location: T _____ R _____ Section _____ 1/4 _____ 1/4 _____

State: _____ County: _____

Elevation: _____ Aspect: _____

Latilong: _____ Hydrologic unit: _____

Nest stratum: _____ Nest height: _____

Position on slope: _____ Nest condition: _____

Land ownership: _____

Directions to nest: _____

Other: _____

Map (1:24000 USGS quad) and Photos

Photograph Showing Nest Site

Photograph Showing Nest

Prepared by: _____ Date: _____

APPENDIX IV

CONCEPTUAL FRAMEWORK FOR DEFINITION OF BALD EAGLE POPULATION MANAGEMENT UNITS[1]

Landscape mosaics (Miller 1978) or mesoecosystems (Rowe and Sheard 1981) are ecosystems linked together. Bailey (1985) defined ecosystems as distinct areas that include associations of interacting biotic and abiotic features. These interacting associations have been variously defined as ecological units, ecodistricts or ecozones.

For purposes of bald eagle management in Montana, they are simply termed, *Population Management Units*. In the context of these definitions, major rivers, lakes and their associated watersheds in Montana are composed wholly or in part, of Population Management Units of various size and number and are contained within larger ecosystems (e.g. the Greater Yellowstone Ecosystem, Northern Continental Divide Ecosystem).

Methods for definition and delineation of Population Management Units for management of bald eagles can range from simple to intricate and be based on ecological, spatial or political considerations or combinations thereof. Definition based predominantly on the former 2 are preferred as they are generally research supported and reflect responses of eagles to environmental condition rather than artificial relationships dictated by political expediency. Some Population Management Units may require indepth, rigorous analysis to define boundaries while others may be self-evident.

Ecological

Specific habitat components, including biotic, abiotic, climatic, and human activity features, may be incorporated together to define Population Management Units within an ecosystem from a landscape ecology perspective. First level Population Management Unit description should focus on determination of aggregations of bald eagle breeding areas in similar habitat. Habitat similarities may be evident and boundaries obvious and based on topographical, faunal (prey base), vegetative (life zones), and climatic associations.

Resoultion of Population Management Unit boundaries may be further determined by on site measurements of macro- and micro habitat parameters (e.g. Wright and Escano 1986, Pfister et al. 1977, Hansen et al. 1991) and available

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[1]*Excerpted and modified by permission of Montana Power Company.*

prey base profiles derived from Stream and Lake Data Base[2] (Holton et al. 1981) within a 5 km radius of most recently occupied nest sites in areas under consideration. Such analysis may provide refined Population Management Unit classification criteria. Cumulative effect of human activity may be evaluated by methods described by Montopoli and Anderson (1991). Cluster analysis (Hintze 1989) or dendrogram analysis (Aldenderfer and Blashfield 1984) using the accumulated database may disclose relative levels of similarity of breeding areas and determine parameters for initial delineation of Population Management Units.

Spatial

Failing resolution of Population Management Units by obvious aggregations of similar or dissimilar breeding areas within an area, spatial criteria may be employed. All breeding areas where nest sites are within 10 mi. (16 km) of nearest neighbor may be considered a "cluster." Population Management Units may contain a single or several clusters, depending on accepted degree of similarity.

Political

The simplest but most ecologically unsound method of circumscribing Population Management Units would employ boundaries of political units such as National Forests, Forest Districts, BLM Resource Areas, MFWP Regions, counties, etc., although some political boundaries may in fact occasionally be consistent with ecological boundaries.

Citations

Aldenderfer, M.L. and R.K. Blashfield. 1984. Cluster Analysis. Series: Quantitative Appl. in the Soc. Sci. Sage Univ. Pa. #44. Sage Publications, Beverly Hills CA. 87 pp.

Bailey, R. G. 1985. The factor of scale in ecosystem mapping. Environ. Manage. 9(4):271-88276.

Bailey, R.G. 1987. Suggested hierarchy of criterial for multi-scale ecosystem mapping. Landscape Urban Plann. 14:313-319.

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[2]*Currently resident at Research and Technical Services Bureau, Montana Dept. of Fish, Wildlife & Parks, Bozeman.*

Hansen, P., K. Boggs, R. Pfister and J. Joy. 1991. Classification and management of riparian and wetland sites in Montana. Draft Ver. 1. Montana Riparian Assoc., Montana For. and Conserv. Exper. Sta. and Sch. Forestry, Univ. Montana, Missoula. 478 pp.

Hintze, J.L. 1989. Solo. BMDP Stat. Software. Los Angeles CA. 85 pp.

Holton, G.D., R.C. McFarland and B. Gooch. 1981. The Montna interagency stream fishery data storage system. Pages 171-177 in N.B. Armantrout, ed. Acquisition and utilization of aquatic habitat inventory information. Proc. Western Div. Amer. Fisheries Soc. 28-30 Oct. 1981, Portland OR. 376 pp.

Miller, D.H. 1978. The factor of scale: ecosystem, landscape mosaic and region. Pages 63-88 in K.A. Hammond (ed.), Sourcebook on the environment. Univ. Chicago Press, Chicago.

Montopoli, G.J. and D.A. Anderson. 1991. A logistic model for the cumulative effects of human intervention on bald eagle habitat. J. Wildl. Manage. 55(2):290-293.

Rowe, J.S. and J.W. Sheard. 1981. Ecological land classification: a new approach. Environ. Manage. 5:451-464.

APPENDIX V

NESTING VARIABLES SELECTED BY BALD EAGLES IN MONTANA

Taken From Montana Bald Eagle Nesting Habitat, A Macro-Habitat Description by Wright and Escano 1986, Table 35

Variable	Mean	SD	Min.	50%	75%	90%	max.
snowfall	100.6 in.	63	<50 in.	<100 in.	< 200 in.	< 300 in.	<300 in.
aspect	10 deg.	—	—	<45 >300	<60 >350	<70 >340	—
slope	17%	20%	0%	<10%	<30%	<40%	64%
position on slope	—	—	flat	lower 1/3	lower 1/2	below ridge top	ridge top
AWB type	—	—	—	lakes	lake & res.	lake, res. and river	
stillwater AWB size	—	—	41 ac.	>1000 ac.	>300 ac.	>100 ac.	126000 ac
running AWB size	all nest sites associated with running AWB are on rivers greater than fourth order in size						
distance to AWB	1027 ft	1216	1 ft.	<1000 ft.	<1500 ft.	< 2000 ft.	5280 ft.
elevation above AWB	101 ft.	129	4 ft.	<56 ft.	<140 ft.	< 260 ft.	567 ft.
line-of-sight		all nest sites were within topographic line-of-sight of AWB					
equatic shoreline	11.3 mi.	5.1	1.5 mi.	>10 mi.	>7 mi.	> 6 mi.	26 mi.
distance to major trib.	1.2 mi.	1.15	.25 mi.	<.75 mi.	<1.5 mi.	< 3.5 mi.	4 mi.
canopy closure	54%	21%	1%	<60%	<75%	< 80%	90%
stand size	49 ac.	47	3 ac.	>30 ac.	>20 ac.	>5 ac.	225 ac.
distance to edge	335 ft.	269	1 ft.	<225 ft.	<425 ft.	< 550 ft.	999 ft.
distance to primitive road	1.23 mi.	1.3	.02 mi.	> .4 mi.	>.15 mi.	>.05 mi.	3 mi.
distance to other roads	1.99 mi.	1.2	.2 mi.	>2.75 mi.	>.5 mi.	>.2 mi.	3 mi.
distance to point activity	1.33 mi.	1.0	.1 mi.	>1.0 mi.	>.3 mi.	>.13 mi.	3 mi.
miles of other roads (3 mi)	17.85 mi.	11.5	1 mi.	<17 mi.	<25 mi.	<34 mi.	52 mi.
number of perm structures (3 mi.)	30	58	0	<12	< 38	< 70	300
% shore (1 mi) development	1.95%	5.9%	0%	equal 0%	<1%	< 5%	35%
% private land (3 mi.)	44%	1%	0%	>35%	>10%	>0%	99%
earest neighbor	9.2 mi.	7.5	2 mi.	<6 mi.	<10 mi.	<20 mi.	40 mi.

APPENDIX VI

GENERAL BREEDING AREA PLAN[1]

1. Background Information.

   A. Basic Information.

      1. Pertinent literature (recovery plan, species biology, management, landowner options, plan examples, and case histories).

      2. List of additional knowledgeable contacts not directly involved with the site(s) in question.

   B. Site-specific information.

      1. Up-to-date map(s) and photo(s) showing nest location(s) ownership(s), and potential sources of human disturbance.

      2. Precise directions to the nest site and to a nondisturbing viewpoint.

      3. Geographic, topographic, and ecological description.

      4. Land use - historic, current, and proposed.

      5. All available history of bald eagle use of the area (i.e., productivity, nesting chronology, perch and roost trees, feeding areas and types of prey, pair behavior, etc.).

      6. Forest stand and understory description.

      7. Nest tree species, size, prominence, form, and condition (longevity?) for all nest trees.

      8. Nest description and location in the tree for all nests.

2. Management recommendations.

   A. Designed to best maintain or improve current condition of the nesting place and food source based on eagle biology and other background information.

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[1] *Courtesy Washington-Oregon Bald Eagle Working Group.*

1. Delineate Nest Site Management Zone boundaries using eagle behavior, landform, etc., as guides.

2. Consider and define restrictions on human activities by area (i.e., permanent road closures, pesticide use, etc.).

3. Consider and define restriction on human activities by time (i.e., seasonal road closures, seasonal logging restrictions, etc.).

4. List and prioritize information needs (i.e., prey base, perch sites, etc.).

5. List and prioritize hazards and conflicts (i.e., land development, logging etc.).

6. List other considerations (i.e., winter use).

7. Estimate how long current condition will persist.

B. Designs to ensure equal or enhanced nesting and feeding opportunities when conditions change.

1. Identify and plan for alternate nest sites.

2. Discuss forest management needs (i.e., artificial nest structures or perches, silvicultural treatments to maintain or improve habitat quality, fuel management, etc.).

3. Anticipate and discuss land use changes.

4. Discuss feeding area/prey base management needs (i.e., artificial perches, plantings for future natural perches, prey base enhancement, etc.).

5. List additional information needs.

6. List other considerations (i.e., will modifications affect winter use?).

3. Compliance and review.

A. Coordinating body to compile a plan agreeable to all participants.

B. All participants to receive a copy of the plan.

C. Implementation schedule.

D. Tie monitoring and further action to land use permitting agencies in a way that keeps all participants involved (i.e., contact all participants when land use changes are proposed).

E. Tie monitoring and further action to annual reviews conducted in conjunction with annual surveys in a way that keeps all participants involved (i.e., annual letters).

F. Update the plan when necessary because of:

   1. Changes in the habits of the eagles.

   2. Land use changes.

   3. New knowledge.

   4. Changes in the attitude/interest of the landowner(s).

   5. Other considerations.

APPENDIX VII

RECOMMENDED STEPS FOR DEVELOPING SITE-SPECIFIC MANAGEMENT PLANS

Recommended Steps	Management Concerns
1. Document historical use of area by eagles.	a. Past nest and roosting sites b. Feeding areas c. Winter use
2. Document habitat conditions of historical breeding areas.	a. Other resource uses b. Vegetative succession c. Prey base d. Changes in waterways e. Pesticide use f. Urban development g. Previous surveys
3. Determine site-specific nesting chronology and productivity.	a. Previous surveys b. Working Group files
4. Delineate breeding area boundaries based upon site-specific habitat use patterns by telemetry or intensive observation.	a. Current nest and roosting sites b. Feeding areas by season c. Winter areas
5. Characterize existing and potential nest sites.	a. Breeding area and nest site measurements
6. Characterize pair behavior.	a. Response to disturbance
7. Evaluate prey availability.	a. Identify fish concentration areas and population trends b. Map big game winter ranges c. Map waterfowl habitat d. Seasonal availability of prey e. Provide site-specific recommendations for protection and enhancement of prey habitat
8. Identify landowners and include them in all management considerations.	
9. Provide direction and coordination with appropriate resource managers or landowners to accommodate bald eagle needs.	a. Identify temporal limits on activities b. Spacial limits
10. Examine the silvics of trees within existing and potential breeding territories.	a. Nest trees b. Shading c. Perches d. Roosts

11. Plan and schedule silvicultural treatments if manipulation is necessary to provide adequate tree size, growth type, and density.	a. Potential nest tree b. Stand thinning c. Stand regeneration d. Species preference or conversion
12. Provide for alternate stands should disease or fire eliminate the primary stand.	a. Protection of tree stands from fire and disease
13. Identify factors which influence productivity and attempt to reduce their limiting effect.	a. Quality of habitat
14. Inventory recreation use levels at sites within and adjacent to occupied and potential breeding territories.	a. Developed recreation sites, campgrounds, special uses. b. Dispersed recreation, land based: landings and campsites. c. Dispersed recreation, water based: landings, campsites, boat dock, and boater use patterns.
15. Provide direction to recreation managers necessary for the protection of bald eagles.	a. Fishing and floating regulations b. Location of access and development c. Necessary closures
16. Identify existing and potential developments within breeding territories.	a. Subdivisions, developments, roads, and associated increases in human activities.
17. Identify special hazards.	a. Powerlines and pesticides.
18. Review site-specific nesting plans with MBEWG.	a. The working group will review plans for adequacy and interpretation of data. b. Management recommendations will be evaluated.
19. Priorities for selection.	a. High hazard rating from surveys b. Poor nesting success c. High potential conflict ratings. d. Any new activities in nest site and primary use areas.

Monitoring of Montana Bald Eagle Breeding Areas to Determine Site-Specific Habitat Use

(Excerpted from Yates, 1989)

1) Monitoring should begin prior to egg laying (February or March) to determine limits of defended territories, and late-winter/early spring food habits and foraging areas. Look for eagles at areas of open water (should be fairly limited in late-winter in most areas of the state). Observers should find an observation point away from inlets or other forage sites 1/2 mile or more from the nest site.

2) Concentrate observations in the a.m. to determine important forage sites, but also cover all daylight hours (each week or so) to determine other forage sites, feeding sites, loafing areas, human disturbance, and roost sites. Should follow birds to other forage sites, as often as possible, when they leave the nest area.

3) Identify all perch and roost sites, and consistently-used flight paths. Plot these on daily field maps (quads). It is expeditious to name (alpha,#) frequently used perches, plot these on a master perch map, and use the alpha name on the data sheets. This saves lots of digitizing. In a dBase III file, UTMs can be added for specified perches fairly easily.

4) Plot all prey captures and attempted prey captures. It's quicker to calculate the UTMs on these daily and add them to the database. Use different codes for each. See printout for dBase III file structure.

5) Record all feeding bouts; bird, time, length, and location.

6) Data entered into a dBase file is readily available for analysis. All disturbance, forage, prey capture, or roost sites can be plotted using GIS by creating separate files for each area of interest. Maps can also be produced for specific time periods if needed. See GIS map.

Use of the Bald Eagle Activities Form (after Yates 1989)

This Bald Eagle Activities form is designed to expedite and simplify collection and analysis of bald eagle nesting, foraging, roosting, and behavioral data. It standardizes collection of weather information, and was developed for use over a 5 year period of bald eagle monitoring.

This form is used for data collection during periods of continuous observations, such as at a nest or foraging site. Observation periods can vary in length, but periods of 2 or 4 hours (or more) tend to provide optimum information, especially at an active nest site.

DIRECTIONS FOR USE:

The top row of the form is for recording the date (Year and [Julian] Day), breeding area (Loc.), observation period (Begin Obs.[24-hour clock], End Obs., Total Obs.[minutes]), observer location (Obs. Loc), weather information (Temp. [Celsius], Precip. [rain or snow], Cloud [% cover], Wind Sp. [speed, estimated MPH], Wind Dir. [direction the wind is coming from], and the data form number (Form) for that observation period. A new form should be started for each observation period.

The columns beneath the top row are for recording specific activities information, such as an adult male bringing food to the nest, feeding of young, perching, etc. Separate rows are used for each activity of interest. Events (or activities) should be recorded chronologically to the nearest minute. There may be long periods when activity is slow, i.e. an eagle perching on the same branch for hours. Or, there may be periods when many activities occur within a minute or less, i.e. an eagle leaves a perch, catches a fish, returns to a perch, flies to the nest, and feeds young. It is important to record these events on the data form in the order that they happened, even though the same time is used for the "Begin Time." Explanations follow.

Begin Time - the minute (ex. 0545) an activity begins. If an observation period begins at 0530 and an eagle is already perched at that time, then the Begin Time for perching would be 0530 as well.

Individual - which eagle is performing the activity? Adult (A), Male (M), Female (F), Chick #1 (C1), etc.

Main Act.(ivity) - the main activities performed by the the eagles of interest. Perching (PER), prey capture (PCAP), adult feeding bout (AFB), adult feeding young (AFY), nest visit (NV), young feeding bout (YFB), night roost (RST), disturbance (DIST), and territorial defense (TD) are most of the main activities.

Location - where did the main activity occur? Alpha-numeric codes can be used to identify specific perches. For example, H95 may be the code for an often used Doug. fir snag along Hauser Lake. To do this, perches need to mapped and described as the

eagles use them. The UTMs can then be digitized later from the master map. Otherwise, perch sites must be mapped daily and identified by time of eagle use. This leads to much more work digitizing. Perches at the nest can be described simply as "nest", and perches on the ground can be assigned codes, or can be identified by using the nearest perch tree code as long as it is within 20 meters. "Ground" can be noted in the Comments column.

Con. Act. (concurrent activity) - is an activity that is of interest but it occurs as a result of a previous activity. For example, the adult male may fly to the nest with dried grass and then copulate with the female. The Main Act. would be a NV (nest visit), but the concurrent activities would be a NMD (nest material delivery) and a COP (copulation). Or, an adult may be perched at a forage site and then flushed by a passing F-16 fighter jet. The Main Act. is a PER (perch) and the Con. Act. is a DIST (disturbance). In this case, a DIST should also be noted in the next row as a Main Act. since it is an important event and DIST is considered a main activity. Besides main activities, concurrent activities include; NMD, COP, PD (prey delivery), BW (bill wipe), DRNK (drink), BATH (bathe), DEF (deficating), NT (nest tending) and PRN (preening). These activities are interesting but not essential to mapping habitat.

Capt. Succ. (capture success) - is used to denote if an activity results in a successful prey capture (yes or no).

Prey Spp. (prey species) - is used to note prey type if it is identifiable; i.e. fish, ground squirrel, etc.

End Time - used to document when an activity ceases. For example, the time when an eagle leaves a perch or finishes feeding young.

Total Time - the number of minutes an activity has occurred; determined by subtracting "Begin Time" from "End Time." For example, an AFB may have occurred from 0615 until 0626; the Total Time is 11 minutes. Or, an adult might be perched at the nest (NV) from 0730 until 1122; the Total Time in this case is 232 minutes.

Comments - is for noting other activities or observations that may be important or useful at a later time. For example, if an eagle is flushed from a perch (DIST) by a nearby bulldozer breaking rocks, it would be useful to record the type and distance to this disturbance stimuli from the perch site.

At the bottom of the data sheet is an area to record other Wildlife Observations including time, species, number, and location. These observations also may be useful at a later date.

BALD EAGLE ACTIVITIES FORM

YEAR	DAY	LOC.	BEGIN OBS.	END OBS.	TOTAL OBS.	OBS. LOC.	TEMP	PRECIP.	CLOUD	WIND S.P.	WIND DIR.	FORM

BEGIN TIME	INDIVIDUAL	MAIN ACT.	LOCATION	CON. ACT.	CAPT. SUCC.	PREY SPP.	END TIME	TOTAL TIME	COMMENTS:

WILDLIFE OBSERVATIONS:

TIME	SPECIES	#	LOC.

APPENDIX VIII

DISPLACED OR DISTRESSED BALD EAGLES: GUIDELINES FOR EVALUATION AND MANAGEMENT

Montana Bald Eagle Working Group

INTRODUCTION

Each year a variety of natural and human-caused events force a number of juvenile bald eagles into locations or conditions in which they may be vulnerable to injury, predation, or disease. Occasionally, young eagles not yet fully capable of flight are encountered on the ground and thought to be in distress or displaced from their nest. Too often these eagles are inappropriately taken from the wild and placed in captivity or held too long to permit survival in the wild subsequent to release. Long-term captivity may deny young eagles the benefit of critical learning from parent eagles, and very young eaglets may become imprinted on humans.

In addition to reducing survival of wild eagles, these actions are often illegal and inconsistent with intent and provisions of the Endangered Species Act and tenets of sound wildlife management. In response to the need for consistency, the Montana Bald Eagle Working Group (MBEWG) developed guidelines and procedures for evaluating and managing prematurely fledged eaglets and other young eagles thought to be in distress.

GOALS AND OBJECTIVES

All distressed young bald eagles encountered should be given every opportunity to remain in the wild and be raised by adult eagles (parent or surrogate). Management strategies should reflect this policy at every level, from initial encounter to final disposition.

In this document, the MBEWG describes some commonly encountered scenarios and presents strategies to attain the following goals:

1. Maximize annual production of bald eagles in the wild.

2. Limit close human interactions with wild bald eagles.

3. Maximize opportunities for distressed bald eagles to be raised in the wild.

These goals have been developed based on the following premise: No one can raise a bald eagle better than its parents! (or other wild adult eagles). Eaglets suffering from a minor or untreatable injury, a non-contagious disease, or poisoning should be left in the wild in as close to natural conditions as possible.

Objectives designed to achieve the above goals are:

1. Establish a network of wildlife biologists and law enforcement personnel to be consulted when distressed bald eagles are encountered.

2. Establish guidelines for evaluation and management of distressed bald eagles.

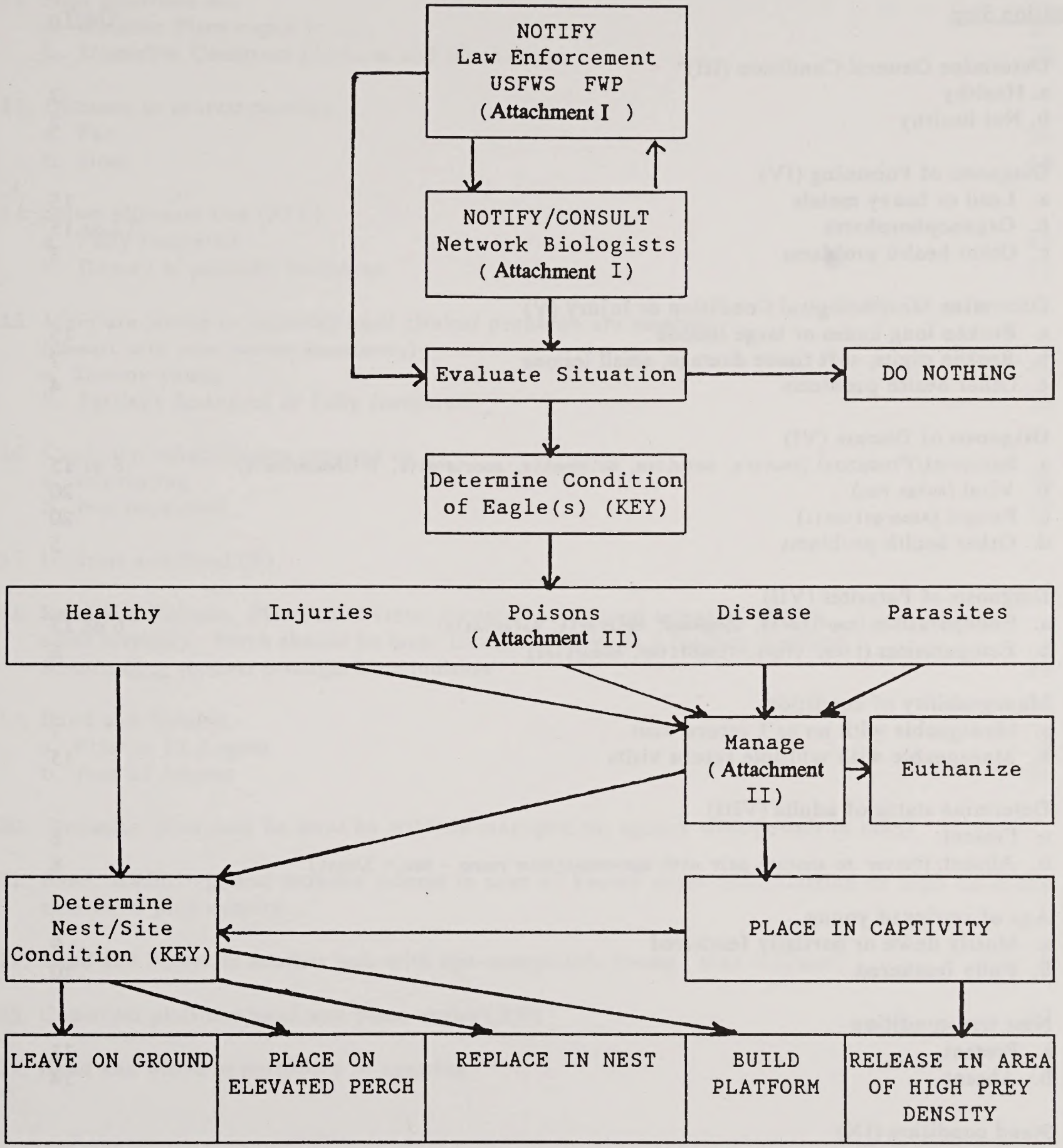
PROBLEM

Bald eagles commonly build large nests, exclusively in trees in Montana. These nests, by sheer mass, sometimes exceed the supporting capabilities of the tree and fall to the ground. Large nests also intercept wind, increasing the probability of "blow outs", especially when combined with wet snow and/or ice during spring. Erosion during periods of runoff may undercut root systems and cause loss of nest trees. Nest tree losses occur throughout the year, but losses due to erosion usually occur during the nestling phase of the annual cycle. Eaglets often survive total or partial nest blow outs but are at risk to predation, injury or lack of parental attendance while on the ground. Older nestlings (>7 wks) may fledge prematurely or be blown from their nest by wind. These birds may be less susceptible to predation, but may be endangered by lack of parental attendance, depending on habitat type and other factors.

EVALUATION & MANAGEMENT PROCEDURE

The flow chart in Figure 1 and the key which follows display the evaluation and management process that should be followed for juvenile bald eagles encountered on the ground or in low perches during the breeding season. Arrows indicate pathways in the process. Cells with upper case text indicate management actions while cells with lower case text indicate evaluation steps. The key follows a dichotomous decision process. Criteria to assist some evaluation steps are presented in **Attachment** II, and these are cross referenced between **Attachment** II categories and key steps. Methodology to assist in each management action is explicit in Appendix III. Diagnosis and treatment of medical condition of displaced/distressed eagles presented in **Attachments** II and III are <u>not</u> intended to replace timely consultation with veterinarians but to provide background and direction for on site evaluation, management, and consultation.

Figure 1: Conceptual framework for evaluation of displaced or distressed eagles. Boxes containing upper case letters are management actions, while boxes with lower case letters indicate evaluation steps.



KEY

Decision Step	Go To
1. Determine General Condition (III)*	
a. Healthy	7
b. Not healthy	2
2. Diagnosis of Poisoning (IV)	
a. Lead or heavy metals	15
b. Organophosphates	12 or 15
c. Other health problems	3
3. Determine Morphological Condition or Injury (V)	
a. Broken long bones or large lesions	15
b. Broken digits, soft tissue damage, small lesions	7
c. Other health problems	4
4. Diagnosis of Disease (VI)	
a. Bacterial/Protozoal (cholera, Botulism, Salmonella, coccidiosis, Trichomoniasis)	6 or 15
b. Viral (Avian Pox)	20
c. Fungal (Aspergillosis)	20
d. Other health problems	5
5. Diagnosis of Parasites (VII)	
a. Endoparasites (capillaria, Syngamus, Heterakis, Ascariasis)	6 or 15
b. Ectoparasites (lice, ticks, fleshflies, blowflies)	6
6. Manageability of condition	
a. Manageable with no or 1 return visit	7
b. Manageable with multiple return visits	15
7. Determine status of adults (VIII)	
a. Present	8
b. Absent: (Foster to another pair with age-compatible young - Max = 3/nest)	8
8. Age of retrieved young	
a. Mostly down or partially feathered	9
b. Fully feathered	10
9. Nest tree condition	
a. Present	11
b. Absent	14
10. Stand condition (IX)	
a. Dense	13
b. Open	18

*Parenthetical numerals indicates references in **Attachment** II

11. Nest tree is...
    a. Climbable 12
    b. Not climbable 14

12. Nest condition is...
    a. Useable: Place eagles to nest 17
    b. Unusable: Construct platform and place eagles 23

13. Distance to nearest opening
    a. Far 24
    b. Near 18

14. Select alternate tree (XIV)
    a. Fully feathered 13
    b. Downy or partially feathered 23

15. Maintain young in captivity until clinical problems are resolved
    (Consult with veterinarian immediately)
    a. Downy young 7
    b. Partially feathered or fully feathered 16

16. Captivity/rehabilitation resulted in...
    a. Imprinting 20
    b. Not imprinted 19

17. Hydrate and Feed (X)

18. Band and Release. Place on obvious, elevated perch near opening, within adult territory. Perch should be large enough to serve as a feeding platform. Return <u>once</u> to treat manageable condition 17

19. Band and Release
    a. Prior to 15 August 7
    b. Post 15 August 21

20. **Euthanize** (Can only be done by wildlife management agency with permit to take)

21. Band, Radio-tag, and monitor release in area of known eagle concentration or high naturally associated prey density.

22. Band and Foster to another pair with age-compatible young. Max = 3/nest. 8

23. Construct platform band and place eagles (XV) 17

24. Band and Move to periphery of opening 18

ATTACHMENT I

A. U.S. Fish and Wildlife Service - Law Enforcement

Missoula:

Special Agent
P.O. Box 7488
Missoula, MT 59807
406-329-3913
FTS: 585-3913

Great Falls:

Special Agent
600 Central Plaza, Rm. 429
Great Falls, MT 59401
406-453-4761
FTS: 585-1363

Billings:

Senior Resident Agent
Rm. 3035, Federal Building
316 N. 26th Street
Billings, MT 59101
406-657-6340
FTS: 585-6340

B. Montana Fish, Wildlife and Parks - Law Enforcement

Region 1:

P.O. Box 67
Kalispell, MT 59901
406-755-5501

Region 2:

3309 Brooks
Missoula, MT 59801
406-542-5500

Region 3:

1400 South 19th
Bozeman, MT 59715
406-994-4042

Region 4:

Rural Route 4041
Great Falls, MT 59405
406-454-3441

Region 5:

1125 Lake Elmo Road
Billings, MT 59101
403-252-4654

Region 6:

Rural Route 1-210
Glasgow, MT 59230
406-228-9347

Region 7

P.O. Box 430
Miles City, MT 59301
406-232-4365

C. Network Biologists

Dale Becker
Confederation of Salish and Kootenai Tribes
Flathead Indian Reservation
P.O. Box 278
Pablo, MT 59855
(406) 675-2700, ext. 386
Home - 883-2980

Dennis Flath
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ATTACHMENT II

EVALUATION

I. Situation

Initial off-site evaluation should be determined with consultation of at least one individual from each enforcement agency and at least one network biologist (Attachment I). No action should be taken without prior notification and consultation. As much information as possible should be available prior to consultation so informed decisions can be made. Information should include:

1. Location of nest site
2. Time/date of discovery
3. Name(s) and phone(s) of all personnel involved in the original discovery
4. Location of eaglet(s)
5. Age of eaglet(s)
6. Condition of eaglet(s), nest, and nest tree
7. Weather conditions on site 2 days prior, current and predicted
8. Status of terrestrial predators
9. Name, phone, availability and experience of planned handler should eagle(s) be removed from site
10. Planned destination of eagles should captivity be indicated
11. Habitat characteristics of site

Attempts should be made to obtain a consensus of all network biologists and law enforcement representatives from both agencies in the appropriate area. The MBEWG understands that no action prior to consultation may result in the loss of some eagles, but the MBEWG feels that these losses are preferable to illegal acts, the potential of imprinting, and maintenance of permanently disabled eagles in captivity.

II. Capture and Handling

Once located on the ground, eagles should be approached with slow deliberate steps, without abrupt or sudden movements. Approach should be from the direction of potential hazard, i.e. river, lake, fenceline, road, downslope. Eagles less than 7 weeks old normally remain stationary or lay down. Eagles older than 7 weeks may attain a defensive posture (wings extended, mouth open, feathers erect) or attempt to escape by running and flapping. If an eagle attempts escape, it should be quickly subdued in order to minimize damage to developing feathers. Eagles laying prone may be secured by slow deliberate approach, gently applying downward pressure to the scapular region to prevent the bird from standing, and moving a hand beneath the bird to grasp both legs just above the feet.

Older eagles assuming a defensive posture pose a significant threat to humans and may be captured by covering the head (or entire body) with a blanket or coat and grasping the legs before uncovering. In the absence of a covering material, capture may be accomplished by waving a hand near the head as a diversion while slowly moving the other hand to grasp the legs.

Once the legs are secured, the eagle should be picked up by placing a hand under the breast and elevating the bird to a prone position. It can then be examined by holding the bird in an erect position, between the chest and forearm of the arm holding the legs. Delicate pressure can be applied to restrain the wings if necessary. Bald eagles bite ferociously, and care should be taken to keep the

head out of striking distance of exposed flesh. Feet should be restrained at all times, since they are the greatest hazard to a handler. Eagles less than 10 weeks old should never be suspended by the legs.

III. General Condition (Key 1)

Field examination of gross morphological condition and behavior on site will often reveal most actual or potential problems. Broken bones, gross lesions, parasites, and severe disease will be immediately evident upon inspection in many cases. Treatment of problems diagnosed is presented under MANAGEMENT PROCEDURES.

The following examination procedure may help to determine general condition:

1. General Appearance and Behavior

   A. Try to determine if the subject is suffering from:

      1. Toxins
      2. Disease
      3. Parasites
      4. Injury
      5. Starvation
      6. Dehydration

   Inability of an eagle to maintain its head erect, head hanging down, to the side, or inverted may indicate severe physiological depression due to any of the above. However, young nestlings assume a motionless prone posture with head extended as an avoidance behavior. Examining the sternum or "keel" to determine condition is invalid. Nestling and recently fledged eagles have not had the opportunity to develop pectoral muscles and sharpness of the keel is not indicative of poor condition.

   B. Drooped wings and constantly erect feathers indicate disease, fever, weakness from starvation, or overheating.

2. Inspect nostrils and mouth.

   A. Soft tissues should be normal pink or slightly blue. If pale, dehydration, shock, or anemia may be indicated. Dry and dull tissues also indicate dehydration.

   B. Presence of blood may indicate internal injury, head injury, esophageal or oral lesion, or simply recent ingestion of food.

   C. Caseous lesions indicate trichomoniasis (frounce), capillaria or vitamin A deficiency, and candidiasis.

3. Inspect eyes. Normal eyes are moist and bright with nictitans (2nd eyelid) movement quick and passing over the eye often.

   A. Dilated pupils may indicate shock, concussion, cerebral hematoma, and blindness. Palpation of skull may indicate fracture and trauma; moving an object quickly toward an eye can demonstrate blindness, dependent on response of the eagle. Asymmetrical dilation may also indicate skull trauma.

B. Half-closed eyes usually indicate weakness or fever.

C. A constant, lateral, slow shaking of the head side to side may also indicate severe head injury and blindness.

D. Closed, swollen eyelids or discharge may indicate direct eye infection or injury of nasal sinuses. Foreign objects may be lodged beneath an eyelid and can be easily removed.

4. Inspect cloacal area and appearance of excrement.

A. Normal excrement is solid, light olive, brown or black center (feces) within a strip of white urates (kidney derivative) or surrounded by urates. Black, soft, liquid feces eroding the white urates as well as obvious blood in white urates may be indicative of internal bleeding.

B. Dried feces and urates around the cloacal area are indicative of dehydration or disease.

C. Green staining of the cloacal area is often indicative of poisoning, especially lead poisoning.

D. Wet feathers, stained with feces, are often indicative of diarrhea.

IV. Diagnosis of Poisoning (Key 2)

Often, symptoms of poisoning match those of injury and disease and may only be determined by clinical blood analysis. However, familiarity with certain symptoms commonly associated with different groups of toxicants , as well as knowledge of local pests, control programs, methods, and poisons in use. Treatment of poisoning is presented under MANAGEMENT PROCEDURES **Attachment** III, Section XI.

1. Lead (and other heavy metals)

Common symptoms associated with sublethal lead poisoning often involve legs and feet. Many eagles lose the ability to open their feet and extend toes. They also exhibit inability to use their lower legs, but may retain adequate wing, head, respiratory, and eye function. The vent is often packed with excrement with extensive green staining. The symptoms of lead poisoning often remain for long periods even with adequate treatment. Recovery, however, is often spontaneous. Other symptoms include severe emaciation and siezures.

2. Organophosphates **(1080, Famphur)**

Symptoms of this type of poisoning are often consistent with lead poisoning (above), but at low levels. Higher levels include central nervous system involvement manifested in tremors, convulsions, rapid blinking, involuntary twitching, wing flapping, and vocalizations.

V. Morphological Condition or Injury (Key 3)

1. Inspect for obvious presence of blood or damage.

A. Dried blood could indicate severe injury, broken blood quills (not serious), or fouling from a prey item. Spreading feathers or cleaning and inspecting the affected area (e.g. mandibles) should help discriminate.

2. Inspect the wings.

   A. Gently grasp the base of the last primary feather(s) and gently extend the wing. This should be done with the eagle in a supine position, head covered and feet secured. Firm pulling should cease if the eagle resists to prevent straining of undeveloped muscles or further injury to damaged tissue. Blow on covert feathers to inspect skin beneath. Alcohol soaking of feathers permits easier inspection without affecting thermoregulatory or aerodynamic properties.

   B. Note blood or bruising. Bruising may not manifest for 24 hours post injury.

   C. Palpate long bones and joints for breaks and abnormalities. It is instructive to inspect both wings in opposite hands coincidentally. This will help alert the examiner to asymmetrical abnormalities.

3. Inspect legs and feet.

   A. Determine if the eagle can grab an object (i.e. branch) and retract legs quickly after extension. Failure to recover may indicate fractures, dislocation, or soft tissue damage.

   B. Note unusual swelling of the toes or ball of foot that may indicate bruising or infection.

   C. Palpate long bones and joints. Coincident palpation of both legs will help indicate asymmetrical abnormalities or injury.

4. Inspect torso.

   A. Dry, scabby areas may indicate coagulated blood, imbedded shot, old injury, parasites, as well as pox virus infection (especially on feet and head).

   B. Subcutaneous lumps may indicate imbedded shot, tumors, bruises and coagulated blood, cysts, or parasites.

5. Inspect Plumage. Birds need feathers in good condition in order to thermoregulate and fly. Too often, worn, soiled, and damaged feathers are not considered when evaluating overall condition of the bird.

   A. Feathers matted with blood, mud, or foreign substances (e.g. oil) cannot often be preened out, predisposing the bird to hypo/hyperthermia and loss of flight capabilities.

   B. Excessive loss of, or damage to, wing and tail feathers reduces capabilities of flight and increases energy consumption. Loss/damage of flight feathers may be considered excessive when more than 3 primaries or 5 secondaries on one wing, or four tail feathers are affected.

VI. Diagnosis of Disease (Key 4)

Most diseases cannot be identified without necropsy, blood smears, fecal floats, radiographs or blood analysis. However, certain symptoms may help indicate possibilities.

1. Bacterial/Protozoal

   A. Avian Cholera: not reported in bald eagles

   B. Avian Botulism: Infrequently reported in raptors. Symptoms include loss of use of legs and inability to hold the head erect as a result of paralysis of neck muscles. Paralysis of the nictitating membrane (2nd eyelid) is also common.

   C. Avian Salmonellosis: Occasionally reported in raptors. Characterized by overall weakness, gasping, lethargy, depression, drowsiness, and diarrhea. Definitive diagnosis is by laboratory isolation of bacteria from fecal matter, or blood of septicemic birds.

   D. Coccidiosis: Common in captive raptors. Overall physical depression associated with small red dots in excrement.

   E. Trichomoniasis (Frounce): Occasional in raptors including eagles that may prey on pigeons. Infected birds exhibit caseous lesions in the oral cavity, which may eventually obstruct mouth, trachea, and esophagus. Easily treated.

2. Viral

   A. Avian Pox: Often reported in raptors, including bald eagles. Obvious wart-like lesions around the eyes, mandibles, featherless portions of legs and feet are characteristic of Avian pox. Commonly a mosquito born infection, it is also a contagious disease, transmitted to healthy individuals through contact of skin abrasions with lesions of contaminated individuals or infected substrates.

3. Fungal

   A. Aspergillosis: Common in eagles. In early stages, characterized by heavy respiration during physical or emotional stress. Gaping becomes constant as the disease progresses followed by gasping then complete respiratory failure. These conditions should not be confused with normal defense postures of some eagles while being handled, i.e. mouth open and tongue protruded, with heavy breathing. Left alone, healthy eagles close their mouth and resume normal respiration quickly while sick eagles continue gasping.

VII. Diagnosis of Parasites (Key 5)

1. Endoparasites

   A. Capillaria: Infrequent in eagles. Birds infected with this roundworm (nematode) exhibit inflammation and swelling of the esophagus and crop. Some lesions of mouth and esophagus resemble trichomoniasis. Microscopic examination of fecal material for presence of elliptical-shaped eggs confirms diagnosis as do swabs of crop and esophagus which may reveal adult worms.

   B. Syngamus (gapeworm): Unknown incidence in eagles. Symptoms include blood clots and excessive tracheal exudate occasionally in association with a 2mm to 4mm lesion in the trachea. Gross symptoms may be similar to aspergillosis, i.e. gaping and panting, occasionally associated with a whistling sound emitted as air passes quickly through the constricted trachea. Behavior is consistent with the bird trying to expel an obstruction.

C. Ascariasis/Heterakis (cecal worm): Probably common in eagles. Intestinal nematodes with non-specific symptoms--diarrhea, debilitation, emaciation--diagnosis is confirmed by microscopic examination of feces. May cause retarded growth in nestling eagles.

2. Ectoparasites

A. Feather lice (Mallophaga). Common in eagles. Small to large (1 m to 15 mm long) white to dark brown lice with large heads. They often move sideways on and amongst feathers. Heavy infestations are usually obvious, but in colder weather, may be detected only by inspecting the base of feathers on the head. Heavy infestations occasionally affect aerodynamic and thermoregulatory properties of plumage. Easily treated.

B. Ticks. Ornithodoros concaeneus, a soft bodied, blood sucking tick is common in raptors. They appear as dark red, nearly black pin head to #7-1/2 shot (2-1/2 mm) diameter. Heavy infestations are most evident around the eyes and nares. Nestling birds may become anemic as ticks congregate and feed around the epitrichium of developing feathers. Easily treated.

C. Flesh Flies. Wohlfahrtia, large (10-12 mm) grey larva have been found in the ears of eagles, potentially damaging otic mechanisms.

D. Blowflies. Flies of the family Calliphora infest eagles by attaching to areas of high vascularization, such as the neck, breast, and feather bases of nestlings. Larva crawl from nesting material where they feed primarily on decaying meat, but also feed on blood in warm areas of the host eagle. Excessive infestations may lead to anemia and disease may be transmitted from larva.

VIII. Status of Adults (Key 7)

Occupancy of the territory by parent adult eagles should be assumed regardless of nest and nestling eagle condition, absence of observations of an adult or even presence of one dead adult eagle. Single parent or surrogate adult eagles can fledge 2 nestlings alone, and foraging eagles may be absent from the nest for up to 2 days depending on the age of nestlings. A nest site should be observed continuously for at least 3 days to determine if adult eagles are attentive to nestlings. The presence of an observer may be sufficient to cause reduced attentiveness by adult eagles if observations are not conducted from appropriate distances or positions.

IX. Stand Condition (Key 10)

Under specific circumstances, newly fledged bald eagles incapable of flight but otherwise secure may not be attended on the ground by adult eagles. If the stand of trees or ground cover are extremely dense, young eagles, although extremely vocal, may not be visually located by adults. More likely, high density vegetation may eliminate flight paths for prey deliveries. Older eagles, fully feathered and capable of ambulation in dense vegetation will move to openings or shorelines in the vicinity of the nest tree if the distance is not excessive (>100m) or obstructed. Hov ver, most eagles choose nest sites with understory and canopy sparse enough so newly fledged eag s on the ground would be visible and accessible, but the situation should be evaluated on site.

ATTACHMENT III

MANAGEMENT PROCEDURES

X. Hydration and Feeding (Key 17)

All eagles should be hydrated unless certain poisons have been diagnosed. Excessive dehydration may be effectively treated only by intravenous (IV) or subcutaneous (SubQ) injection of lactated ringers or 5% dextrose and water, administered once the eagle has been placed in captivity. In severely diseased and/or dehydrated birds the GI tract can shut down, leading to regurgitation and drowning.

Field hydration is best accomplished by gavage tube and syringe. Fluids should be warmed if possible. Care should be taken to ensure the gavage tube is inserted well down the throat and into the crop. Induction of water should be slow enough to prevent fluid from welling up in the throat and entering the glottis of the trachea (opening at base of tongue). In the absence of gavage tube and syringe, eagles may be hydrated with a vial, canteen, bottle, etc. by depositing water on the distal lower mandible, allowing water to flow slowly around the tongue and down the esophagus, carefully avoiding the trachea.

All eagles left on site or placed on a platform should be fed, unless the crop is already full. Adult eagle attendance to grounded, replaced or manipulated young may subside temporarily subsequent to human presence or intervention and one time supplemental feeding will help insure adequate energy intake during the adjustment or adoption period.

Appropriate, fresh prey species should be cut into long (5 cm to 8 cm), thin (3 cm) pieces, immersed in water and forced down the eagle's throat. Two individuals should be involved; one responsible for restraint of the eagle, the other for feeding. Insertion of food may be accomplished by grasping the eagle around the neck from behind and below the mandible with one hand and forcing the mouth open and inserting the food with the other. After hungry eagles have tasted food, they often will take additional food with minimal manipulation. Eagles often will strike aggressively at food and hold it in the mouth. Swallowing may be induced by pulling and releasing the food quickly, as if to mimic normal feeding action.

Food also should be left for young eagles on platforms, branches or elevated perches. However, the food should be elevated and placed in such a way as to minimize attraction of and access by predators. Volume of food should not exceed 2 days rations.

XI. Management of Poisoning

A. Lead: Eagles should be placed in captivity. Treatment consists of isolation (see Maintenance of Eagles in Captivity) and administration of Calcium EDTA, 35-40 mg/kg, 3 times (TID) per day, SubQ, intra muscularly (IM) or I.V.: 3 days on, 2 days off for at least 2 cycles or until symptoms subside. Ca EDTA is available commercially as Havadote (66 mg/cc) or Calcium Versenate (50 mg/cc).

B. Organophosphate Toxicosis: Atropine Sulfate, 1 mg/kg injected SubQ or I.V. only once. Atropine administration will often produce results/recovery within 30 minutes. Prophylactic administration is generally without consequence. Absence of recovery may indicate other toxicosis or disease. Eagles so poisoned may be treated and left on site.

XII. Management of Injury

A. Damaged plumage

1. Developing blood quills often bleed profusely immediately post puncture or breaking, but bleeding subsides quickly without direct treatment. Appropriate management is to calm the eagle to reduce heart rate and respiration by hooding or isolation. Surrounding feathers should be cleaned if fouled and matted with blood. If damage to developing flight feathers is excessive, the eagle should be retained in captivity until natural molt replaces damaged quills (4 to 6 weeks).

2. Fully developed or "hard-penned" feathers may be repaired by grafting appropriate lengths of molted feathers to remaining shafts by a process known as "imping". Eagles should not be removed from the site for imping, but the site revisited if consultation prescribes. Local falconers or network biologists should be conscripted to imp feathers.

B. Broken bones

1. Most broken bones should be treated by a veterinarian. However, some minor non-compound fractures to distal portions of toes are best managed by leaving the eagle in care of the parents. The liabilities of extended captivity far outweigh the benefits of repairing minor fractures to the toes. Eagles have survived in good condition with a broken leg or toes or missing a foot or toes.

C. Soft tissue damage

1. Most soft tissue damage is untreatable and eagles so injured should be left on site. Selection will cull individuals that do not recover/adapt and resolution by natural processes are preferable to permanently disabled or imprinted captives. A veterinarian and network biologists should be consulted before final management decisions are implemented.

D. Lesions: Small lesions should be cleaned (not with Alcohol) preferably with Betadine solution, and the eagle left on site. Birds have a remarkable ability to fight infection and heal. Large lesions may only be managed in captivity in consultation with veterinarians.

XIII. Management of Disease and Parasites

A. Avian cholera: Death ensues quickly so treatment is usually not possible. Chlor- and Oxy-tetracycline antibiotics control cholera in poultry. The Pasteurella organism is highly contagious and consideration should be given to reducing exposure to siblings.

B. Botulism: Treatment consists of continuous hydration (see Hydration and Feeding: Section X above) to flush the intestines and dilute toxins produced by the Clostridium bacteria. Treatment and maintenance should be accomplished in captivity.

C. Salmonellosis: Treatment is difficult. Drug therapy includes Tetracycline, polymyxin, chloramphenicol, sulfaguanidine or nitrofurazone and should be administered only under the care/advice of a veterinarian once the bird has been remanded to captivity.

D. Coccidiosis: Treatment in captivity by sulfa drugs i.e. sulfa metroxine (25 mg/lb. initially, then 12.5 mg/lb. 3 to 5 days, or until subject is symptom free for at least 2 days).

E. Trichomoniasis: Eagles infected with frounce can be treated in the nest unless lesions require additional therapy. A single dose of Flagyl or Emtryl 500 mg/lb. (65-100 mg/lb. of active ingredient) will cure most cases.

F. Avian Pox: Untreatable. Infected individuals should be euthanized and carcass incinerated due to the highly contagious nature of the avipoxvirus (Note law enforcement considerations on euthanasia procedure and carcass disposition).

G. Aspergillosis: By the time clinical signs are evident, the course of the disease is usually irreversible, and euthanasia is indicated. Amphotericin B, 75 mg/kg daily for 1 week, administered I.V. has been effective in some non-raptorial birds. Recently, early stages in a Peregrine falcon have been successfully treated with capsulated Amphotericin B. Birds should be placed in captivity and treatment administered only by a veterinarian as the drug is extremely nephrotoxic.

H. Capillaria: Treatment may be administered on site and consist of a single dose of 1 mg/gm piperazine citrate, I.V. Other drugs include oral dosage of .5 mg/kg Levamisole hydrochloride or 50 mg/kg Tetramisole in water (see Hydration and Feeding, Sect. X)

I. Syngamus: In captivity, Thiabendazole, 500 mg/kg orally per day for 7 to 10 days

J. Ascariasis/Heterakis: In captivity, one time dose of piperazine 125 mg/lb., plus liquid paraffin to lubricate the digestive tract. After 3 weeks, dose should be repeated to remove worms which were larva during the initial treatment. Birds may be left in the wild and treated with a 1 gram dose of 7:2 phenothiazine and piperazine.

K. Mallophaga: A liberal spraying of the infected bird with any commercially available bird spray containing pyrethrins or dusting with Sevin will be effective. Spray should be worked into the base of down and feathers. Care should be taken to shield the eyes, mouth, and nares when spraying the head.

L. Ticks: Dusting the bird and nest with commercially available Sevin will effectively treat tick infestation.

M. Flesh flies: Treatment consists of mechanical removal of larva.

N. Blowflies: Mechanical removal of larva and dusting with commercially available bird sprays may eliminate fly larva.

XIV. Selection of Alternate Tree (Key 14)

Species of alternate trees selected for placement of young or construction of a platform is relatively unimportant. However, structural and site characteristics are paramount and should mimic original nest site and tree. Alternate trees should be tall, large, old, codominant or dominant, in an open stand as far from human activity and as near the original site as possible. Average height and DBH of nest trees used by bald eagles in Montana was 30m and 96cm respectively. Slope under the alternate tree should be flat or if not available, at least mid slope or lower. Selection of alternate trees also should be based on accessibility, visibility by parent bald eagles (and humans should further

management action be needed), stability, and protection from the elements and potential predators. Alternate trees should also be as close as possible to a forest opening.

XV. Construction of Platform (Key 23)

A. Positioning. Over 61% of bald eagle nests studied in Montana were located adjacent to the main trunk of a tree rather than peripheral branches and platforms should be so positioned. Most bald eagle nests in Montana were about 22m high and nearly all had a direct line of site to a river or lake. Platforms constructed as replacement nest substrates should mimic these conditions as much as possible in the original or alternate tree. Access openings, free from obstructing branches, should be at least 160° arc from the main trunk, larger if possible. Placement also should consider shelter from sun and wind.

Platforms may be constructed in the original tree but in a lower position if the nest cannot be accessed to replace displaced eagles. Fostered and displaced eagles have fledged from platforms so positioned, as long as most other criteria are satisfied.

B. Materials and Construction: Human made or modified materials (2 x 4's, plywood) should be avoided when constructing platforms. Bald eagles generally avoid artificial structures for perching so use of natural supports and substrates will decrease acceptance time and increase attendance potential. Nails should not be used because the platform is intended to function only in the short term (until young fledge), not as a permanent nest substrate.

Sticks 3-5m long and 2-4cm diameter should be used to construct platforms. Supporting branches (with diameter of at least 6 cm if live, at least 12 cm if dead) emanating from main trunk at the same height and projecting in a slight positive angle over horizontal should be used as base. Three layers of sticks may be woven or cross-hatched together to form a nearly level surface. Area of the platform should be at least 90 x 90 cm. The less time evaluating, locating and constructing the platform, the better.

XVI. Considerations for Maintenance of Displaced/Distressed Eagles in Captivity.

Consistent with goals and objectives, the following basic concepts should be adhered to when maintaining young eagles in captivity:

A. Housing: should be large enough to allow relatively free movement. Ventilation, shade, and sunlight should be optimal to prevent overheating or chilling. Plumage condition is commonly ignored by rehabilitators. Substrates should be adequate to permit exercise without damaging developing feathers and perches should be placed to prevent fouling of plumage with excreta. Windows with verticle bars should permit expansive views of natural habitat without visual pollution by human presence or activity.

B. Care and Feeding: Contact with humans should be kept at an absolute minimum, especially when associated with feeding. All visual association of humans with food must be avoided. An imprinted bald eagle is a dangerous entity, totally unsuitable for release, education, captive breeding, falconry, or exhibition. Non-imprinted juvenile bald eagles in captivity become habituated or tolerant of humans if continually exposed; they may become "conditioned" to food associated with humans also. Upon release, they are highly susceptible to human-induced mortality.

Food should be natural, local prey species, fresh and unfrozen as much as possible. Young bald eagles raised on frozen foods commonly develop vitamin B deficiencies, often resulting in death or irreversible developmental deformaties. Eagles should not be overfed. Natural foods should be as diverse as natural diets which often contain 10 or more species. Fresh, clean water should be available at all times.

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APPENDIX IX

Procedures for Reporting Eagle Mortalities

REPORTED BY: _____
Name

_____
Date

_____
Agency and Office

Species: _____ Age Class: _____

Found by and date: _____

Band Number: _____

Auxiliary marker: _____

Location: T_____ R_____ Section_____ 1/4_____ 1/4_____

County: _____ State: _____

Apparent Cause of Death: _____

Age and Condition of Carcass: _____

Deposition of Carcass: _____ Date: _____

Carcass Tag Number: _____

Remarks: _____

_____

_____

Quad Name:

Map (1:24000 USGS Quad) and Photos
Glue on back if necessary

Original to MBEWG. copy to accompany carcass.

APPENDIX X

Presidential Documents

Memorandum of April 29, 1994

Policy Concerning Distribution of Eagle Feathers for Native American Religious Purposes

Memorandum for the Heads of Executive Departments and Agencies

Eagle feathers hold a sacred place in Native American culture and religious practices. Because of the feathers' significance to Native American heritage and consistent with due respect for the government-to-government relationship between the Federal and Native American tribal governments, this Administration has undertaken policy and procedural changes to facilitate the collection and distribution of scarce eagle bodies and parts for this purpose. This memorandum affirms and formalizes executive branch policy to ensure that progress begun on this important matter continues across the executive branch.

Today, as part of an historic meeting with all federally recognized tribal governments, I am directing executive departments and agencies (hereafter collectively "agency" or "agencies") to work cooperatively with tribal governments and to reexamine broadly their practices and procedures to seek opportunities to accommodate Native American religious practices to the fullest extent under the law.

As part of these efforts, agencies shall take steps to improve their collection and transfer of eagle carcasses and eagle body parts ("eagles") for Native American religious purposes. The success of this initiative requires the participation, and is therefore the responsibility, of all Federal land managing agencies, not just those within the Department of the Interior. I therefore direct each agency responsible for managing Federal lands to diligently and expeditiously recover salvageable eagles found on lands under their jurisdiction and ensure that the eagles are promptly shipped to the National Eagle Repository ("Repository"). To assist agencies in this expanded effort, the Secretary of the Interior shall issue guidelines to all relevant agencies for the proper shipment of eagles to the Repository. After receiving these guidelines, agencies shall immediately adopt policies, practices, and procedures necessary in accordance with these guidelines to recover and transfer eagles to the Repository promptly.

I support and encourage the initial steps taken by the Department of the Interior to improve the distribution of eagles for Native American religious purposes. In particular, the Department of the Interior shall continue to adopt policies and procedures and take those actions necessary to:

(a) ensure the priority of distribution of eagles, upon permit application, first for traditional Native American religious purposes, to the extent permitted by law, and then to other uses;

(b) simplify the eagle permit application process quickly and to the greatest extent possible to help achieve the objectives of this memorandum;

(c) minimize the delay and ensure respect and dignity in the process of distributing eagles for Native American religious purposes to the greatest extent possible;

(d) expand efforts to involve Native American tribes, organizations, and individuals in the distribution process, both at the Repository and on tribal lands, consistent with applicable laws;

(e) review means to ensure that adequate refrigerated storage space is available to process the eagles; and

(f) continue efforts to improve the Repository's ability to facilitate the objectives of this memorandum.

The Department of the Interior shall be responsible for coordinating any interagency efforts to address continuing executive branch actions necessary to achieve the objectives of this memorandum.

We must continue to be committed to greater intergovernmental communication and cooperation. In addition to working more closely with tribal governments, we must enlist the assistance of, and cooperate with, State and local governments to achieve the objectives of this memorandum. I therefore request that the Department of the Interior work with State fish and game agencies and other relevant State and local authorities to facilitate the objectives of this memorandum.

With commitment and cooperation by all of the agencies in the executive branch and with tribal governments, I am confident that we will be able to accomplish meaningful progress in the distribution of eagles for Native American religious purposes.

The Director of the Office of Management and Budget is authorized and directed to publish this memorandum in the Federal Register.

William J. Clinton

THE WHITE HOUSE,
Washington, April 29, 1994

[FR Doc. 94-10885
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Billing code 3110-01-M

Editorial note: For the President's remarks to American Indian and Native Alaska tribal leaders, see the *Weekly Compilation of Presidential Documents*.

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